

Sustainable design strategies

Examination of aesthetics and function in zero waste and upcycling

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Summary:

The objective of the research is to examine sustainable design strategies from a designer's point of view. The frame of the thesis is based upon the notion of function and aesthetics and the hypothesis is that when these two elements coincide within design only then can we speak of sustainable design. The research is a qualitative hermeneutic study and the theoretical framework consists of theories that explain the fashion system, basic human needs, sustainable design, durability and sustainable design strategies as forms of waste management. All in all, the point of the theoretical framework is to expand the context of sustainable design and what it means in terms of design qualities. In the centre focus of the thesis there are two design strategies: zero waste and upcycling. The aim of the study is to find out whether function and aesthetics can be seen in these two strategies and if they really affect the overall sustainability of the clothing. The research material consists of six different cases that are designed using either zero waste or upcycling as the principal design strategy. The first stage of the analysis deals with aesthetic analysis method developed by Marilyn DeLong and the second stage is conducted by using Victor Papanek's function matrix as a reference. The results of the research point to the conclusion that both aesthetics and function have an effect on the overall sustainability of the design.

Keywords: fashion theory, needs, sustainable design, durability, sustainable design strategies, zero waste, upcycling, function, aesthetics

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Tiivistelmä:

Tutkimuksen tavoitteena on tarkastella sustainable design strategy -käsitettä suunnittelijan näkökulmasta. Tutkimuksen viitekehys rakentuu vaateen funktionaalisuuden ja esteettisyyden ympärille, jossa hypoteesina on, että ekologisesta suunnittelusta voidaan puhua vain silloin kun nämä kaksi elementtiä yhdistyvät tuotteessa. Tutkimus on toteutettu laadullisena hermeneuttisena tutkimuksena, jonka teoreettinen viitekehys käsittelee muodin teoriaa, ihmisten perustarpeita, ekologista suunnittelua, kestävyyttä sekä sustainable design strategy -käsitettä. Laajan teoriaperehdytyksen tarkoituksena on laajentaa ekologisen suunnittelun kontekstia, sekä sitä miten tämä vaikuttaa design-tuotteen laatuun. Tutkimuksen tarkasteluun on valittu zero waste ja upcycling -strategiat, joita analysoidaan etenkin funktionaalisuuden ja esteettisyyden lähtökohdista. Tutkimuksen tarkoituksena on selvittää ennen kaikkea sitä, miten nämä kaksi strategiaa vaikuttavat tuotteen ekologisuuteen. Tutkimuksen aineisto koostuu kuudesta asukokonaisuudesta, jotka on suunniteltu käyttäen joko zero waste tai upcycling -strategiaa. Analyysin ensimmäisessä vaiheessa käytetään Marilyn Delongin kehittämää esteettisen analyysin mallia, jonka jälkeen siirrytään tarkastelemaan vaateen funktionaalisuutta pohjautuen Victor Papanekin funktiomatriisiin. Tutkimuksen tulokset osoittavat, että esteettisyydellä ja funktionaalisuudella on vaikutusta tuotteen ekologisuuteen.

Avainsanat: muodin teoria, tarpeet, ekologinen suunnittelu, kestävyys, sustainable design strategies, zero waste, upcycling, funktionaalisuus, esteettisyys

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1. Introduction

In this chapter I will explain the reasons as to how I came to pick my research subject and what that entails. I will also go through some of the theoretical base for the research and introduce my research questions. In the chapter *Research material and methods of analysis* I will present my way of concluding the analysis and how that relates to the subject of the thesis. Lastly I will also explain briefly the research process in order to provide the reader a short overview of the way the research was conducted.

1.1. Preface

My first introduction to the subject of sustainable design strategies was through literature. I was especially interested in the way designers see and approach sustainability in their design process and what kind of an impact that can have on the sustainability of a product. According to John Ehrenfeld sustainability does not only concern itself with the environment but rather the whole state of human life¹. Sustainability is too often mistaken into having only effects on the environment, when in fact it also affects people, culture and the whole society. Therefore, it is not enough just to consider the effects from a single point of view, but we need to apply multifaceted methods of approach that consider the whole range of effects that contribute to sustainability and well-being. Jonathan Chapman writes about the importance of different design practices in terms of achieving sustainability. According to him, design is a transformative and future-oriented activity that uses "a rich repertoire of tools, methods and approaches, which strengthen the transformative power of design to establish a clear social, economic and ecological purpose".² Also Kate Fletcher agrees that design that has been integrated into working within the principles of sustainability has the potential to bring ecological and social changes in the future³. In this frame of mind, sustainable design strategies are at least in theory the answer to how we can integrate the principles of sustainability into design practices and bring change into consumption habits and increase general well-being.

¹ Ehrenfeld 2015, 57.

² Chapman 2015, 80.

³ Fletcher 2013, 558.

In sustainable design, it is important to consider function and aesthetics as integral elements to the design process. Kate Fletcher writes that many people associate sustainable fashion with functional and almost utilitarian clothing. They practice a certain way of consuming where they insist on buying less clothing and even when they do they source them second hand, Fair Trade or organic. According to Fletcher, such a way of consuming while helping to "reduce the speed and quantity of consumption" still views the future from a negative perspective that essentially "uses yesterdays thinking to cope with the conditions of tomorrow".⁴ Sustainable design does not mean that we have to abandon our needs for aesthetics in the expense of function. Jonathan Chapman also discusses change in terms of fashion. According to him, change is a natural part of the world and without it "we fabricate the material world as though it can be fixed, set in place and frozen".⁵ Fletcher suggests that instead of giving up on fashion we need to "ally it with sustainability"⁶. This would involve making significant changes in our way of using resources and bringing better conditions to those who work within fashion industry.

Within fashion industry there has been many attempts to sustainable design — some more successful than others. Overall the main focus of sustainability has been related to the materials and textiles. According to Lynda Grose the overall textile flow and use of virgin material have been used as indicators of environmental impact⁷. The on-going trend has been using less virgin material and increasing the amount of organic or recycled materials in the production in the attempt to make the clothing more sustainable. However, if we are using only recycled or organic materials as indicators of sustainability the overall effects of production will not change better for the environment⁸. There are opportunities beyond that which take into consideration the actual principles of sustainable design. These opportunities are called sustainable design strategies.

In *Shaping Sustainable Future, Changing the Way We Make Things* Alison Gwilt introduces a figure of the known sustainable design strategies compared with a conventional design process. According to the figure, sustainable design can be attempted through the use of

⁴ Fletcher 2007, 121.

⁵ Chapman 2015, 75.

⁶ Fletcher 2007, 121.

⁷ Grose 2015, 223.

⁸ Hethorn & Ulasewicz 2008, introduction.

design strategies which affect the process from a sketch to the finished product and even beyond that. The graph includes strategies such as design for the end-of-life strategies, design for disassembly, design for waste minimisation, design for social well-being, design for slower consumption, design for user participation and design for product service systems.⁹ According to Gwilt different strategies are a way for the designer to make sure that their work is done under sustainable design principles.¹⁰ These strategies offer a kind of a method or a structuralized path for designers to follow. For this thesis, I have modified the original figure in order to provide a mind map of the complexity of sustainable design strategies that will help in realizing the whole scope of the design field in fashion industry. (See Figure 1.)

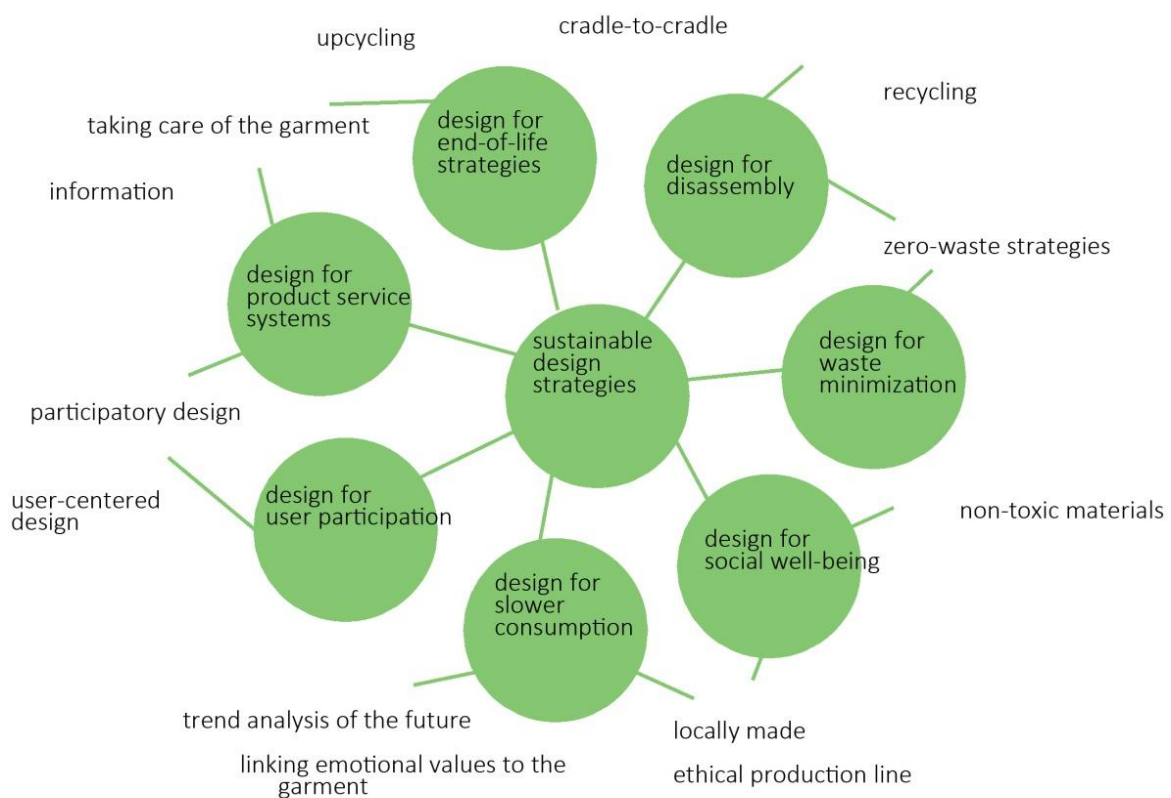


Figure 1. Sustainable design strategies according to Gwilt (2011), modified by the author

My interest towards sustainable design has steadily increased during the time I have been studying clothing design at the University of Lapland. Already my Bachelor's thesis had to

⁹ Gwilt 2011, 68.

¹⁰ Gwilt 2011, 69.

do with sustainability. The focus of it was on sustainable fashion and how it reflects to the aesthetics of the clothing. While the thesis was on some level a stepping stone towards my Master's thesis, it still lacked depth regarding the issues that are related to sustainable design. During my studies, I have had many opportunities to learn in practice and in theory what it means to design sustainable clothing. Through my participation in various workshops, I have had the opportunity to deepen my knowledge about sustainable design especially in terms of sustainable design strategies. These workshops have included using zero waste practices, upcycling, waste management and creating concepts that have to do with sustainable design. One of the most notable workshops in terms of this thesis was the Trash to Trend workshop in Tallinn that was organized by Reet Aus, who specializes in upcycling waste materials and the way it is possible to create something of a higher quality from those materials. Aus has written a doctoral thesis about the subject and she has an upcycled fashion line. In addition to workshops I have designed my own collections that are based on the zero waste principle and I have also received some recognition in regards to my work through different design competitions. My latest achievements had to do with designing a sustainable work wear collection for Lindström Award Design Competition in 2014 as well as placing into semi-finals on the Eco Chic Design Competition in 2015 with my collection which was based on the concepts of zero waste and upcycling. Thus, in a way the idea for my thesis has been a continuum of my previous work and participations in design workshops and competitions.

1.2. Research questions and the aim of the thesis

The topic of research has to do with sustainable design which I am approaching from a designer's point of view. The main research question is: Does the use of sustainable design strategies have an effect on the function and the aesthetics of clothing? The aim in performing the research is to analyse the effects of zero waste and upcycling in terms of design qualities and examine whether they have a clear effect on the aesthetics and function of clothing. I will also attempt to find answers to my sub-questions which are as follows: What kind of needs can be satisfied by wearing sustainably designed garments? Are there any limitations as to what kind of design problems the strategies can be used for? Can a designer increase the durability and emotional value of clothing by using sustainable design strategies on the design level? How do zero waste and upcycling as

sustainable design strategies compare with each other in terms of design qualities? By answering these questions, I will acquire a better understanding of what it means to design sustainable clothing and fashion.

As I mentioned before, I will be examining the information through my own perspective that has to do with being a designer. However, in order to perform objective research it is necessary to voice one's own opinions of the subject, to ensure that they won't have an effect on the outcome of the research. The reason why I picked my research topic has to do with the quite general misconception as to what it is to design sustainably. I view sustainability from a design's point of view, where elements such as aesthetics, function, durability and emotions make for a successful design. Therefore, in order to achieve sustainable design we need to also consider fashion and how the design ties in with the society and culture of today.

In the research, I am using the hermeneutic approach which enables me to make interpretations and gain an in-depth understanding of the researched phenomenon. When talking about hermeneutic research, it is crucial to note that in hermeneutics the body of research forms from different pieces of information and their interpretations. This is also known as the hermeneutic circle. According to Anttila, in order to understand the whole, the first step is to create a model for the interpretation and form a background understanding of the research subject. She also points out that after gaining understanding of the research field it is time to move on to the first actual interpretation level and use dialog as a tool to communicate between background information and research material.¹¹ According to Mads Folkmann hermeneutics can be viewed as a frame of understanding that is never complete since we keep acquiring more and more knowledge during the research process and even after the research has been completed.¹² This might become a problem in the sense that the amount of information in hermeneutic research is infinite. However, as the circle goes on, the research becomes more in-depth and specific about the researched subject.

¹¹ Anttila 1998.

¹² Folkmann 2013, 42.

1.3. Research material and methods of analysis

The research material of the thesis consists of images that are analysed based on the theory background and within the principles of hermeneutic research. For the research material I have selected different photos of sustainable fashion that are designed using two of the sustainable design strategies. The chosen strategies are zero waste and upcycling. In the analysis, I have in total six examples, three from each design strategy. These examples include designs from Titania Inglis, Bolor Amgalan, Ada Zanditon, Reet Aus, Amandah Andersson and Orsola de Castro. In terms of the research material, I have decided only to analyse the designs through photographs, since assessing the whole processes involved in design and production is not possible within the realm of this thesis, nor do I possess the data for it.

The frame of the research is based on aesthetics and function, where my presumption is that sustainability can only be attained when both of those elements coincide within the design. (See Figure 2.) Therefore, my methods of analysis have to do with finding out whether the two strategies have an effect on the aesthetics and function of the clothing and how they manifest themselves in terms of sustainability.

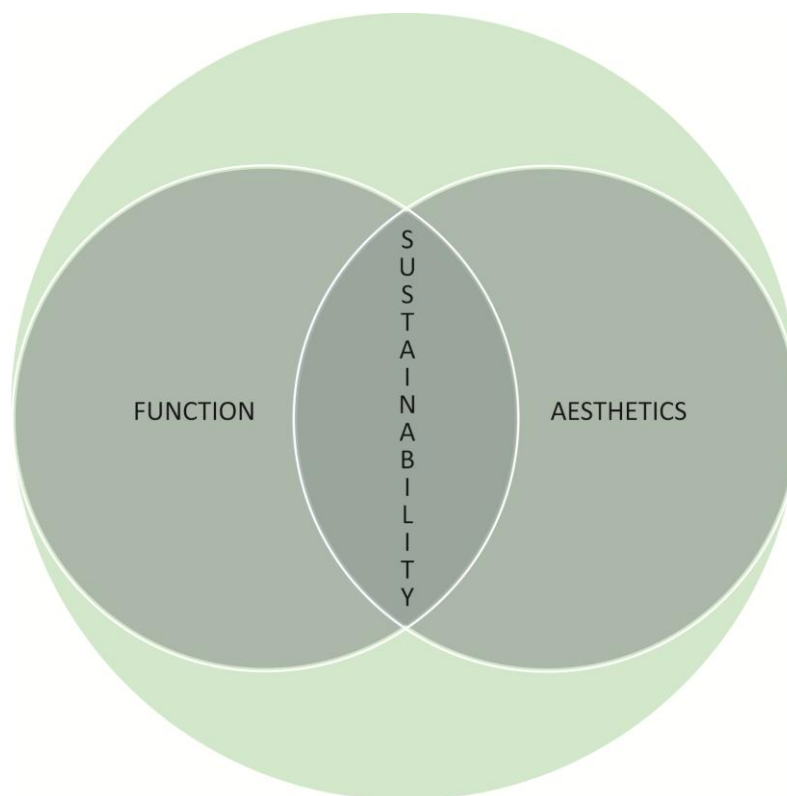


Figure 2. The frame of research

For the first stage of the analysis, I will use Marilyn Delong's approach to full perceptual awareness which deals with aesthetic analysis of the apparel-body-construct. This method comprises of four stages that are observation, differentiation, interpretation and evaluation.¹³ In this part of the analysis, I will deconstruct the aesthetic image and arrive at some kind of a result as to how the different strategies have affected the overall aesthetic response and what kind of associations that response has to society, culture and sustainability. The second stage of the analysis focuses on the functional side of the clothing which will be carried out based on the theory of Victor Papanek in *Design for the Real World: Human Ecology and Social Change*. I will use Papanek's six sided function matrix in order to determine how functional the different designs are. The matrix consists of method, use, need, teleasis, association and aesthetics.¹⁴ However, it should be noted that since in the previous stage I have already examined the aesthetical qualities of the designs, I will only be using five stages of the function matrix in the analysis. After completing the process of the analysis, I will compare the designs and how well they exemplify the different sustainable strategies according to aesthetics and function. I will also attempt to answer the research questions I posed earlier and compare the results with the theoretical base of the thesis.

1.4. The process of research and theory

This thesis consists of six main chapters that contain information about the issues dealing with sustainable fashion through the lens of sustainable design strategies. The actual process of research has been quite complicated due to the enormity of the research subject. However, as a subject it still exemplifies the important issues that are very current in fashion industry. The factor that brings cohesion into the research is the context of sustainability that follows through each part of the thesis and comes to conclusion in the end. I have depicted the research process in a figure form, where the information and theories all intertwine with the hermeneutic circle. (See Figure 3.) Thus, I will explain the process and the related main theories briefly in order for them to make more sense to the reader of this thesis.

¹³ Delong 1998.

¹⁴ Papanek 1995, 34.

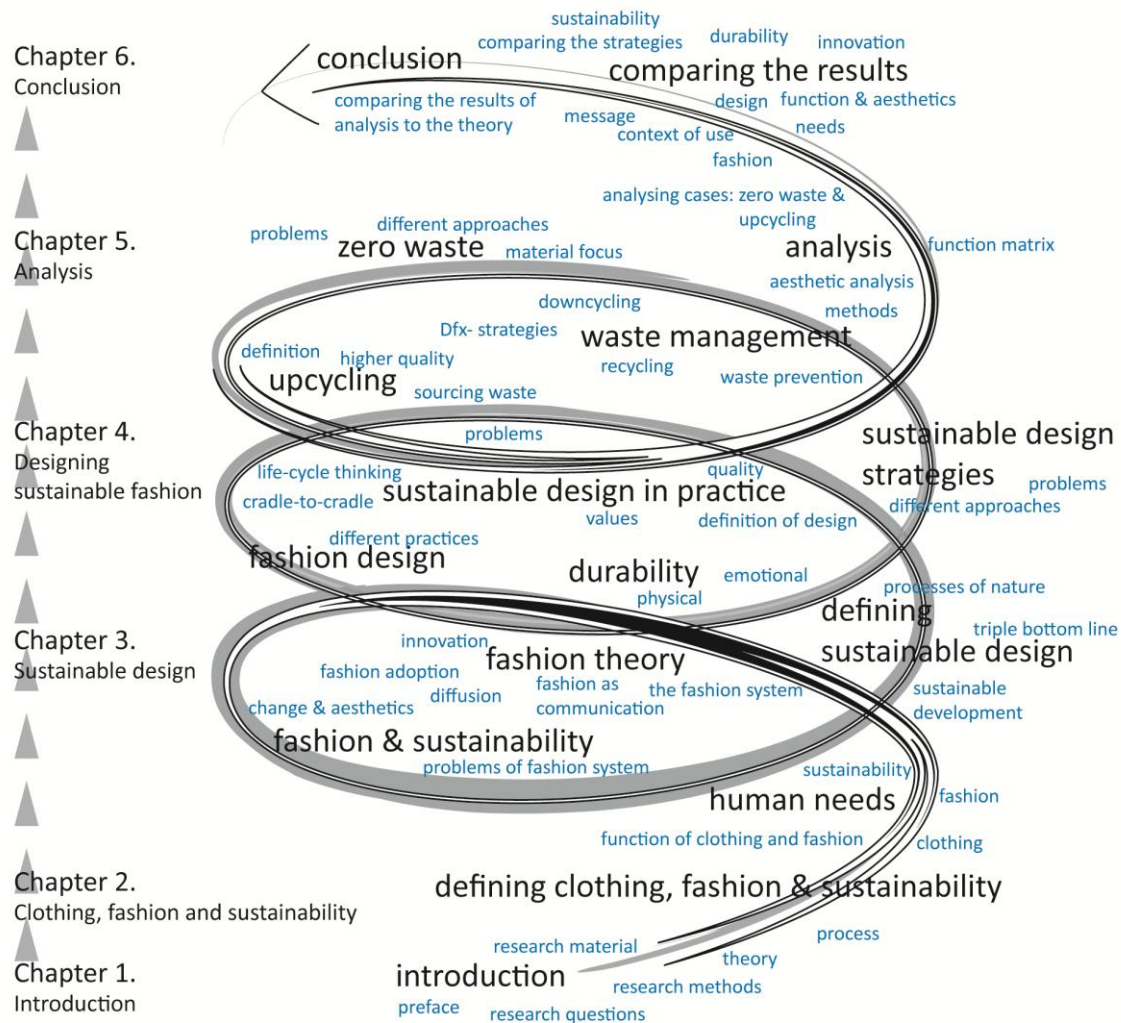


Figure 3. The process of research

The first step in my thesis has been discussing the fashion aspect of clothing. I begin the second chapter by defining the terms clothing, fashion and sustainability in terms of what human needs they satisfy. Here I will use Manfred Max-Neef's theory of fundamental human needs and compare it with other fashion theories that relate to the function of clothing and fashion. Then I will move on to examining some of the main theories behind fashion. The theories include fashion adoption, diffusion of innovations, fashion as communication and change theories. Then I will briefly discuss the problems in fashion industry in order to compare fashion theories with sustainability especially from the point of view of change and aesthetics. In the chapter I have referenced writers such as Barnard, Loschek, Sproles & Burns, Hethorn & Ulasewicz and Kawamura and many more in the process building up the background.

The third chapter has to do with sustainability especially in the design field. The first step is to define what sustainability means in the design context using theories such as sustainable development and triple bottom line. Since the chapter focuses on sustainable design, my second step is to examine what it means in theory. My theoretical base consists of many different design experts and researchers the most notable of which are Jonathan Chapman & Nick Gant, William McDonough & Michal Braungart, Kate Fletcher, Sandy Black and Miguel Gardetti & Ana Torres, to mention a few. After this, I will compare the practices of sustainable design with those of fashion industry and also examine durability and emotional design in the context of sustainability.

The fourth chapter is titled *Designing sustainable fashion* and it is about sustainable design strategies. In the chapter, I will examine sustainable design strategies from a perspective of waste management and what it means to use these strategies in practice. Then I will move on to zero waste where the theory is largely based on works of Timo Rissanen, Alison Gwilt and Holly McQuillan. My focus is on introducing some of the most practiced approaches from material and life-cycles perspectives and also discussing some of the problems of the strategy in theory. Lastly, I will discuss upcycling using mainly the work of Reet Aus as an example. In this part I will examine how to source waste, what upcycling means and how it affects the overall quality of design.

The fifth chapter is the part where I will conduct the analysis of this thesis. I will start this process from the methods I will be using in the analysis. After explaining the methodology, I will move on to the selection process of the cases, where I will discuss my methods of choosing the cases for the analysis. Then it is time to conduct the actual analysis, where I will be examining both design strategies in terms of function and aesthetics. Lastly, I will compare the results of the analysis and review it against the background and theory of the thesis.

The sixth chapter is the conclusion where I discuss the research methods in terms of how well they suit the topic and whether I found answers to my research questions. I will also examine the significant themes that were visible in the analysis and compare my findings with the theory of sustainable design. Finally, I will also evaluate my own research process and discuss my own aims in terms of how well they were achieved in the research.

2. Clothing, fashion and sustainability

2.1. Sustainable fashion - a discussion

Why is it relevant to use the term sustainable fashion instead of sustainable clothing? To answer the question, we need to take a closer look on the definitions of the terms and consider the processes involved in clothing and fashion.

If we consider the terms, 'dress' or 'clothing' are probably the most used terms when discussing clothing in different cultural contexts and among different people. Joanne Entwistle states that "dress is a basic fact of social life" and different ways of dressing oneself besides clothing include tattooing, cosmetics and other forms of body enhancements¹⁵. It is true that while culture and society give us certain rules for dressing oneself, clothing can also be used for personal gain in the sense that it can be used to reflect one's identity and personality. According to Eicher, Evenson and Lutz, the process of dressing oneself, whether it is done to modify or supplement the body, is a way to address physical needs and to meet the social expectations that curate how an individual belonging to a certain social group should look¹⁶. In different eras or even today there are different levels of body modifications that are accomplished by wearing certain kind of clothing. One of the most well known examples of body modification is a corset which was commonly used by women in the 19'th century throughout different social groups in western countries. Even today some people choose to wear corsets in the attempt to enhance one's body image and to meet some social standards of beauty, which in this case is to have a small waist. Ingrid Loschek conceptualizes the idea by stating that clothing in fact "designs the body"¹⁷.

Entwistle writes that while dress is the result of pressures, the dressed body always has a connection with the situation it is found in¹⁸. Loschek goes even further and claims that "fashion functions as fashion only in the environment for which it is determined" which essentially means that objects should be evaluated always according to their context¹⁹.

¹⁵ Entwistle 2015, 6.

¹⁶ Eicher, Evenson & Lutz 2008, 4.

¹⁷ Loschek 2009, 18.

¹⁸ Entwistle 2015, 15.

¹⁹ Loschek 2009, 147.

Therefore one needs to address the situational and environmental components in order to assess what kind of clothing or dress is appropriate in the situation. For example, if one is attending a wedding celebration it is very likely that casual garments will be frowned upon, since the appropriate dress code is formal. Similarly when conducting research on dress or clothing, one has to know the social customs in order to make the right assessments regarding what the clothing represents in that current situation and what are the components that reflect the user's identity.

If we try to compare the two terms 'clothing' and 'fashion', we will see that 'clothing' is used to describe material items. Fashion, on the other hand, while relating very closely to the material side of clothing, also includes other symbolic meanings that correspond to other basic needs discussed later in the chapter. According to Kawamura, the difference between clothing and fashion is in the intangible nature of fashion. The two terms also vary in their function where clothing has first of all a utility function whereas fashion has a status function. Kawamura also adds that while clothing can be found "in any society or culture where people clothe themselves, fashion must be institutionally constructed and culturally diffused. A fashion system essentially operates in order to convert clothing into fashion that has a symbolic value and is manifested through clothing".²⁰

Also Fletcher discusses the differences between clothing and fashion in the context of sustainability. She agrees that while fashion and clothing have different properties they are both integral to creating well-being through their functional and emotional properties. She also adds that in order to create "more sustainable change we have to better understand the function of clothes".²¹ Through understanding the function of clothing, designers can more effectively create better products that have increased value as well. Thus fashion is not something that diminishes the value of clothing but on the contrary. According to Kawamura fashion provides extra values to clothing it otherwise would not have²². Loschek argues that the main difference between clothing and fashion is the social purpose that fashion seems to have. By adding the element of fashion, clothing is "supplemented by semblance and illusion, which are defined as increased

²⁰ Kawamura 2005, 44.

²¹ Fletcher 2008, 119.

²² Kawamura 2005, 4.

value or additional usefulness".²³ Therefore the use of the term sustainable fashion is integral if the purpose is to create clothing that is both sustainable and has a social purpose.

In this chapter I will discuss some of the most important aspects of fashion industry that also have an effect on sustainability of clothing. These aspects include some of the theories behind fashion, how innovations are being shifted, what meanings fashion terms and definitions hold and how human well-being can be increased by the creation of sustainable fashion.

2.2. The function of clothing and fashion in terms of human needs

Before moving on to the topic of functions of clothing and fashion, one needs to be informed of the basic terminology of human needs and the processes that explain how they are formed. In *Emotionally Durable Design* Jonathan Chapman discusses the basic theory behind the forming of human needs and the meanings behind those processes. According to him the term 'need' is very closely related to motivations, which are actually born from needs themselves. These motivations shift constantly and their purpose is to fulfil the void that has been created when a person is experiencing a lack in their needs.²⁴ A lack can be a creation of inside or outside world and usually when we are discussing needs that have to do with advertising they are the result of outside forces put into motion. According to Robert Bocock "consumption is founded on a lack", which drives consumers to consume more and more without ever feeling complete satisfaction²⁵. It is true that while most consumption thrives towards selling more products and services, some needs can only be satisfied by actual tangible things. Without physical items people do not have any tangible means for identification, or as van Hinte puts it, products "carry meaning and are constant reminders of who we are"²⁶. One could even go as far as to say that most of culture is defined by material items which explains different patterns of thought and behaviour in culture.²⁷

²³ Loschek 2009, 134.

²⁴ Chapman 2015, 41.

²⁵ Bocock 1993, 69 in Chapman 2015, 41.

²⁶ van Hinte 1997, 222 in Chapman 2015, 178.

²⁷ Eicher, Evenson & Lutz 2008, 36.

Many theories of dress have discussed the functions of clothing. In *Fashion Design* Sue Jenkyn Jones states that clothing or dress has evolved in order to fulfill practical and protective needs. According to her, these practical functions of dress are utility, modesty and adornment.²⁸ Utility deals with protecting the body from different environmental hazards which include temperature, humidity and different situational risks. Modesty then has to do with covering one's body according to the views of culture that are considered appropriate. According to Jones, society demands propriety and sometimes it has even gone as far as to pass certain laws that prohibit too extraordinary clothing from being worn²⁹. Such current examples are, for example, the wearing of traditional burqa by many Muslim women. Adornment has to do with using clothing to express a certain sense of aesthetic taste. According to Jones, while adornments usually showcase our creativity as individuals and signal our standing in society, they can also work against our comfort, movement and even health. She also adds that adornments can be either permanent or temporary.³⁰ While the majority of adornments used today are temporary additions to the body, such as clothing and jewellery, some adornments are in fact permanent in the sense that they permanently change the body. Good examples of permanent adornments are tattoos which can signal different things about the wearer. At some situations these adornments can also work against basic needs if a permanent tattoo is not accepted in certain social groups or if its meaning no longer reflects the identity of the wearer.

While these three functions of dress have to do with material context, fashion has many more functions it can fulfil according to Sproles and Burns. They suggest that fashion has a potential to satisfy five additional functions, which are a need to be up-to-date, a need to adjust to a changing society, a desire to escape boredom, a need for symbolic differentiation and a need for social affiliation.³¹ According to Jones the need to be modern can signify creativity and preparedness for adjustments in the future³². This tendency to look ahead and be willing to change is crucial to the whole fashion system that functions mainly within the changing societies. One could also begin to explain the need to adjust to a changing society from the same perspective of fashion change.

²⁸ Jones 2011, 24.

²⁹ Jones 2011, 25.

³⁰ Jones 2011, 27.

³¹ Sproles & Burns 1994, 191.

³² Jones 2011, 28.

According to Sproles and Burns, especially the fashion adoption process gives individuals the means to adjust to social change³³. A desire to escape boredom can then be an explanation why people want new things and are excited when new fashions come about. According to Jones, a need for symbolic differentiation is manifested by people's need to "use clothing to differentiate and recognize profession, religious affiliation, social standing or lifestyle"³⁴. Lastly the most important function of fashion is the need for social affiliation, which according to Sproles and Burns includes the functions of social acceptance, approval and a feeling of belonging³⁵. While it is important to feel like one is accepted and part of a larger social group, one still has to be able to maintain one's identity. Sometimes this can cause conflicts which will have an effect on the social standing if an individual is too unique and thus not accepted as he or she is.

So as established before, clothing and fashion have a purpose which is to satisfy some of the basic human needs. In his studies concerning South African communities and their wealths and poverties, Manfred Max-Neef found out that there are nine fundamental human needs that are integral to human well-being. (See Figure 4.) These needs are subsistence, protection, affection, understanding, participation, leisure, creation, identity and freedom. According to Manfred, these needs can be recognized in every culture, but they may be satisfied in different ways. These satisfiers include being, having, doing and interacting.³⁶ In different cultures the need for protection could then be satisfied either by having protective clothing or interacting with others in a way that adds to the feeling of safety. Depending on the circumstances and culture, different satisfiers act as tools with which people create wealth and well-being.

According to Manfred, satisfiers can be "forms of organization, political structures, social practices, subjective conditions, values and norms, spaces, contexts, modes, types of behaviour and attitudes"³⁷. Manfred also talks about satisfiers in the sense that they may work against other needs. He uses the term 'destroyer' in this context. These are satisfiers that while satisfying one need they actually destroy other needs.³⁸ That way some

³³ Sproles & Burns 1994, 192.

³⁴ Jones 2011, 27.

³⁵ Sproles & Burns 1994, 194.

³⁶ Max-Neef 1992, 206-207.

³⁷ Max-Neef 1992, 201.

³⁸ Fletcher & Grose 2012, 132.

satisfiers also may have an effect to multiple needs at once. For example the need for subsistence can be satisfied by drinking polluted water from a river during a hiking trip, even though the drinker may be aware of the threats that it may cause to their health. In this scenario one satisfier actually destroys other needs, which would be the need for protection. One should also note that there are no ways to determine which need will correspond with which satisfier. According to Max-Neef, a satisfier may fulfil different needs at the same time or in order to satisfy a need one may need multiple satisfiers³⁹.

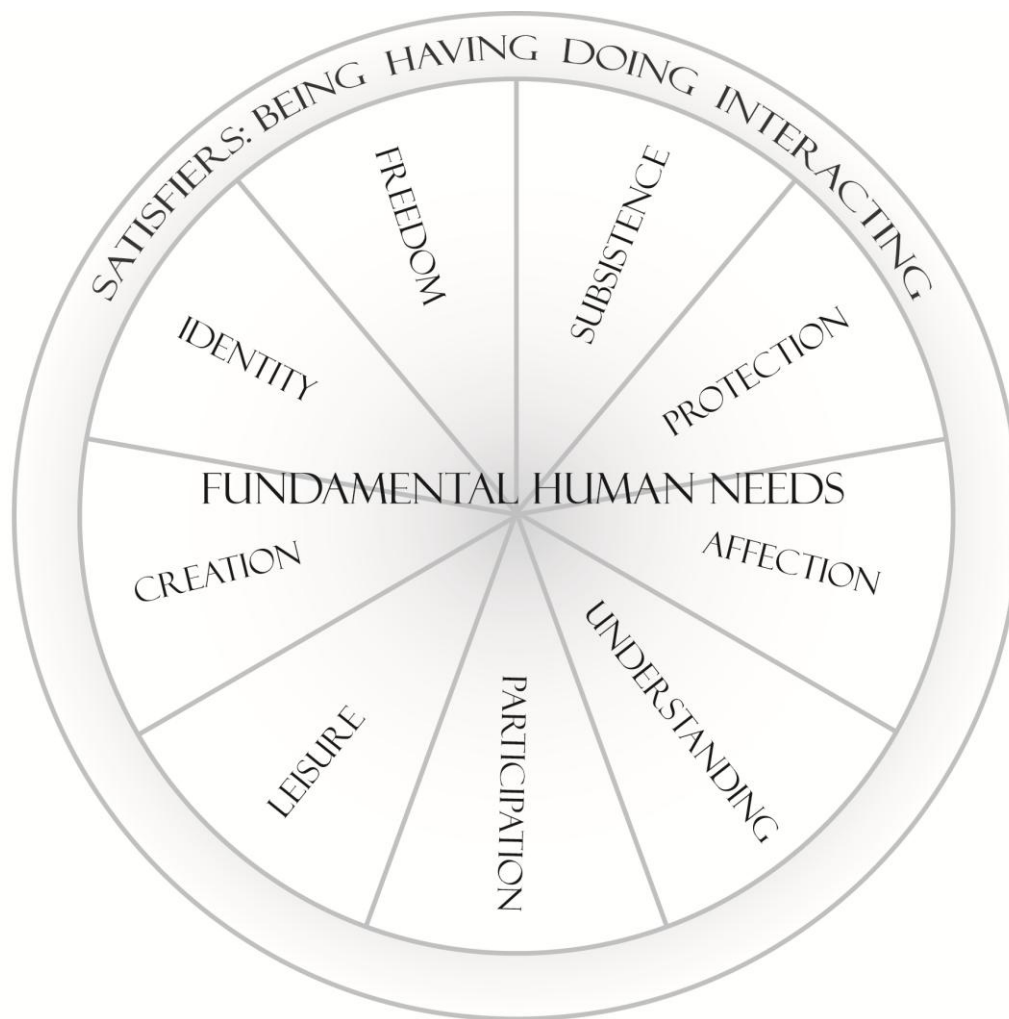


Figure 4. Fundamental human needs according to Manfred Max-Neef (1992), redrawn by the author

Since fashion and clothing are different entities, they also satisfy different needs. According to Fletcher and Grose, clothing can satisfy basic physical requirements that

³⁹ Max-Neef 1992, 200.

have to do with warmth and protection⁴⁰. Already Flugel agreed that the purpose of clothing is to protect its wearer and serve other purposes such as providing decoration and modesty⁴¹. If we look at Manfred's fundamental human needs, the most apparent needs that can be satisfied by wearing clothing are subsistence and protection. According to Mario Kamenetzky the need for subsistence is the most powerful source of motivation⁴². By having clothing one can fulfil the need for subsistence such as the basic need for warmth. The need for protection could then be attained by having clothing or performing actions to get more protection provided by the clothing. In addition to the two basic needs, clothing can have an effect on the needs of participation and creation. The need for participation could be satisfied by having specific kind of clothing that makes it possible to take part into a certain event. Lastly the need for creation can be fulfilled by three satisfiers that are being, having and doing. For example one can be inventive within one's clothing, have certain abilities that help to create clothing and then lastly do or make actual garments and that way satisfy the need for creation. It should be also pointed out that not everyone will get this many needs fulfilled by the simple act of having clothing, but the main point here is to visualize that there are many possibilities within the realm of clothing.

Fashion then has different purposes in which it can satisfy our basic needs. According to Loschek the function of fashion is based on the emotional and communicative values. She also suggests that "people value not the material value of costumes, fashions and accessories but their symbolic function of aesthetics, eroticism, knowledge or power".⁴³ From this point of view, it seems that the tactile or material side of clothing in terms of functions and fulfilling basic human needs is secondary, whereas the real value of clothing is formed by fashion. What are the needs that can be satisfied by fashion then? First and foremost fashion has the potential to satisfy our need for personal expression and the feeling of belonging to a social group⁴⁴. So if we look at Max-Neef's classification⁴⁵ the needs that fashion can satisfy are affection, understanding, participation, identity and

⁴⁰ Fletcher & Grose 2012, 133.

⁴¹ Flugel 1930 in Welters & Lillethun 2011, 169.

⁴² Kamenetzky 1992, 181.

⁴³ Loschek 2009, 155.

⁴⁴ Fletcher & Grose 2012, 133.

⁴⁵ Max-Neef 1992, 206-207.

freedom. Affection with regards to fashion can be attained via multiple satisfiers that have to do with sharing emotions and building relationships with others. Also the need for understanding and participation can be achieved via interaction with others, since fashion has a way of communicating information about its wearer's personality, status and culture. The last two needs, which are identity and freedom, have to do with showcasing one's personality and sense of willingness through fashion where the satisfiers are most likely being, having and doing. Although there may be even more needs that correspond with fashion, I would still hesitate to claim that fashion can satisfy all of the needs, since it is most essentially a way of communication and self-expression and it does not have any tactile properties unlike clothing. It is, however, crucial to acknowledge that without fashion the way in which we communicate would be much narrower and we would have to rely on spoken words and expressions of others significantly more. Fashion also needs another component that can carry the message from one person to another, which according to Fletcher and Grose helps in building relationships with other people in our society⁴⁶. This component is clothing.

2.3. Sustainability needs

In order to understand what sustainability means and which needs it has the potential to satisfy we need to take in consideration needs, not just from clothing's point of view but also from fashion's point of view⁴⁷. The need to wear clothing is something different than the need to look fashionable as established before. On one hand clothing on its own acts as a satisfier to some of the material needs such as the needs for subsistence and protection. Fashion, on the other hand, has to do with satisfying non-material needs such as the need for identity and participation. In order to understand what possibilities sustainable fashion has, one has to include fashion and clothing as well as the aspect of sustainability into the mix. In terms of Max-Neef's theory concerning human needs and their satisfiers, sustainability can be considered a universal satisfier that can have an effect on all the basic human needs as well as prevent from poverties.

In his article *Searching for Sustainability* John Ehrenfeld writes about needs that correspond with the principles of sustainability. According to him, products that are

⁴⁶ Fletcher & Grose 2012, 138.

⁴⁷ Fletcher 2008, 120.

designed sustainably should be able to produce human satisfaction for the long haul.⁴⁸ Therefore fashion system itself should go through a transformation where products are not indispensable commodities but rather long-lasting and transformative elements that could possibly change as the changes in society happen and still remain up to date. Fashion, while having an effect on our aesthetic needs, may cause problems in the long term from the perspective of fundamental human needs. Max-Neef mentions that "any fundamental human need that is not adequately satisfied, reveals a human poverty"⁴⁹. Thus in sustainability we must find a way to decrease poverties in order to create well-being. Today different marketing tactics play on our desires and in some ways even dictate which products are perceived as fashionable and this season's "must-haves". Fletcher and Grose point out that when fashion becomes an external goal it can create self-doubt and insecurities.⁵⁰ For example, one may think that by satisfying the urge to buy a product the urge to do so comes from inside while most of the time the push to buy things is actually caused by external urges such as ads, commercials and peer pressure. Regarding the needs concerning sustainable clothing, it is therefore meaningful to first make the distinction between what needs are internal and actually crucial in the whole process. To ensure that these kind of dissatisfiers do not create poverties, sustainable fashion must be able to react to different people's needs and allow enough space for their personal well-being.

In the report of the World Commission on Environment and Development otherwise known as the Brundland report, the main objective of sustainable development is to satisfy basic human needs and aspirations. The essential needs listed in the report consist of food, clothing, shelter and jobs which should be met in order to provide people with better lives.⁵¹ Since clothing is a key component in creating a more sustainable future, sustainable fashion must meet the expectations of current fashion and also improve in a way that does not leave behind any poverties. The key for achieving this is in making sure that all people have an equal opportunity to buy clothing that they choose and also making sure that the actual items are ethically produced and well made. In some aspects

⁴⁸ Ehrenfeld 2004, 7.

⁴⁹ Max-Neef 1992, 201.

⁵⁰ Fletcher & Grose 2012, 133.

⁵¹ Report of the World Commission on Environment and Development: Our Common Future 1987, 41-42.

it is true that clothing cannot fulfil the symbolic needs of fashion, nor does it have to. However there needs to be a change in the fashion system that allows more room for different fashions that last longer and provide rather than create lacks. According to Fletcher, the key to diverse a fashion system lies in the relationships within the fashion system itself. Rather than focusing on only one side of fashion we should concentrate on creating more value through the process by integrating participation and creating relationships between people and the environment.⁵²

2.4. Fashion theory

Fashion is a core element in the clothing industry. It can be used to determine everything from a single look to a whole style. Different fashion styles go out from time to time in a cyclical periods of time and one of the most apparent aspects of fashion is change. In studies, fashion is understood as a complex term that can be used to describe many different aspects of the clothing industry. Moreover fashion has an effect on everybody's lives. It is a way to express oneself and communicate with others that is a crucial part of every social situation. According to Loschek fashion theory "endeavours to interlace scientific methods and creative design processes in a productive way, in order to establish a self-reflective form of cultural practice"⁵³. Therefore fashion theory is in the core of every culture, and in order to understand what it means, we have to know some of the basic principles of fashion to understand what it means to be a part of the fashion system.

According to the Oxford English Dictionary 'fashion' is "a popular style of clothes — at a particular time or place" and more specifically" the business of making or selling clothes in new and different styles".⁵⁴ Fashion has to do with social behaviour and the ways in which people interpret things in social situations. According to Wilson, Breward and Evans fashion can be viewed as a modern phenomenon with "the relentless movement of ideas, styles, and the apparent 'speed' at which they change".⁵⁵ It is also very characteristic for fashion to have a significant weight on body and its presentations.⁵⁶ It is widely acknowledged that while fashion is a term which has to do with social acceptance and it is

⁵² Fletcher 2008, 125.

⁵³ Loschek 2009, 7.

⁵⁴ Oxford English Dictionary 2010.

⁵⁵ Wilson 2003; Breward & Evans 2005 in Entwistle 2009, 8.

⁵⁶ Entwistle 2009, 8.

clearly transfixed to a certain time or a place, one of the key aspects of fashion is in fact change.⁵⁷ Above all, fashion is another term used to describe the change of time. This claim can be visualized very easily if we were to look at pictures from earlier eras of fashion. For example, even going back to the 1980's one can see a considerable difference in fashion with models wearing huge shoulder pads. In today's world most of us would consider such fashion very old-fashioned whereas in the 1980's it may have been completely usual or even highly fashionable attire.

Many studies concentrate on describing fashion as a way of communication. Malcolm Barnard writes in *Fashion as Communication* that fashion and clothing "may be the most significant ways in which social relations between people are constructed, experienced and understood"⁵⁸. That being the case the way we dress plays an important role in the way other people perceive us. Also Tullia Jack agrees that clothing and especially consumption of fashion in most societies is "a way to signal wealth, identity and social status"⁵⁹. Simmel talks about fashion as a communication aid stating that in the core of all communication is the need to be part of a group or a society⁶⁰. However, Barnard adds that while people want to belong to a larger social group they still want to maintain their individuality⁶¹. From this one can draw a conclusion that a single piece of clothing that does not convey any kind of communication cannot be in fashion. On the one hand people's need to be accepted as a part of a social group but they still want to maintain their own individual style and convey their personality through the way they dress.

Sproles and Burns define fashion in *Changing Appearances* through four key elements. First of all, fashion has to do with an object. Secondly, that object is only temporary. Thirdly, fashion is based on social appropriateness. Lastly, fashions are usually adopted by certain social groups.⁶² While it is good to know that fashions do not have to have the capacity of pleasing everyone, they do have to be considered appropriate by a certain group of people in order for them to be considered as fashions. Kawamura agrees that

⁵⁷ Sproles & Burns 1994, 31-45.

⁵⁸ Barnard 1996, 7.

⁵⁹ Jack 2013, 125.

⁶⁰ Simmel 1971 in Barnard 1996, 10.

⁶¹ Barnard 1996, 11.

⁶² Sproles & Burns 1994, 3.

clothing habits in general are "the result of a group life"⁶³. Examples of this kind of group behaviour can be found anywhere where there are cultures and subcultures. Sometimes even smaller fashions can be transformed so that they are accepted by larger societies and become widely accepted fashions. To explain such transformation patterns, Yurchisin and Johnson introduce the innovation adoption curve that explains how most people accept certain fashions over a period of time. The curve is divided into five different parts based on how people adopt new innovations or fashions: fashion innovators, early adopters, early majority, late majority and laggards.⁶⁴ As the time goes on more and more people adopt new fashions, given that the early adopters also grow in number during the first stages of introducing new innovations.

One of the key elements of fashion is change which is directly connected to the changes in society. Loschek claims that change is not the primary aspect of fashion. However, according to her, "the economic concept of seasonal renewal" still explains why new fashions are being created and also accepted by consumers.⁶⁵ Even though especially in the traditional fashion system the changes occur periodically, there are alternatives that either slow down the changes in fashion or on the other end of the spectrum increase the pace of those changes. According to Loschek the changes in fashion are perceived very subjectively at least from a consumers' point of view⁶⁶. Some consumers are more accustomed to the fast-paced changes in fashion whereas others feel constantly out of touch. From an economical point of view the changes create more consumption and therefore more opportunities for companies to sell more items.

If we look at fashion as an innovation, there are also other theories that suggest that all new fashions go through some sort of screening before they are widely accepted by the public. Everett Rogers suggests that the process in which new fashions are accepted can be divided into five stages. This theory is called diffusion of innovations and the stages of the process are awareness, interest, evaluation, trial and adoption.⁶⁷ In each stage more and more people get exposed to certain innovations which then may end up all the way

⁶³ Kawamura 2005, 76.

⁶⁴ Yurchisin & Johnson 2010, 4.

⁶⁵ Loschek 2009, 134.

⁶⁶ Loschek 2009, 143.

⁶⁷ Rogers 1962 in Sproles & Burns 1994, 17.

to the adoption stage if they get enough positive reviews from a large number of people. It is however possible that some of the new innovations may be discarded early in the process if they are not accepted. Evelyn Brannon suggests in *Fashion Forecasting* that sometimes the innovation can be rather a small thing. According to her the innovation can be for example a new fibre or a finish, an unusual colour, a modified silhouette or detail or a different way of wearing certain piece of clothing.⁶⁸

When considering the diffusion process of fashion one needs to note that while Rogers talks about the acceptance of different innovations, the stage model has to do with multiple social systems and a large number of people. As individuals people still make their own decisions, which according to Kawamura can be seen during the adoption process⁶⁹. There are also certain differences between different cultures. Kawamura writes that "in societies oriented towards change, the overlap of innovation and opinion leadership is greater than in more tradition oriented cultures"⁷⁰. So, the greater the innovation the riskier it can be to get it accepted especially in societies that value traditions greatly.

In *Fashion and the Consumer* Yurchisin and Johnson explain the complexity of fashion system and the change that is so prominent in many of the definitions of fashion⁷¹. According to Frings, fashion "reflects changes in people's life-styles and current events", "people's needs change" and "people get bored with what they have"⁷². The change can happen in any state of the fashion system and sometimes it may not be a visible change. For example, if some of the changes happen in the production state, such as on the fibre level, the end customer may not know that something is different, yet the change or innovation in fashion system may be quite substantial. However, most changes that have to do with fashion are quite easily noticed by people. These changes have to do with the aesthetic side of fashion; the styles, looks, materials and colours. These changes have an effect on what is considered appropriate or in style. Although Frings claims that people's needs change⁷³, it is also possible to think about the matter from a completely different

⁶⁸ Brannon 2010, 41.

⁶⁹ Kawamura 2005, 74.

⁷⁰ Kawamura 2005, 75.

⁷¹ Yurchisin & Johnson 2010, 11.

⁷² Frings 1996, 65 in Yurchisin & Johnson 2010, 11.

⁷³ Frings 1996, 65 in Yurchisin & Johnson 2010, 11.

perspective. From that perspective one could argue that the actual needs stay the same and only the satisfiers go through some kind of change as the time goes on. A fashion garment can lose its meaning or at least some of its communicative properties.

To understand the change in fashion and the process in which different inventions get more attention Yurchisin and Johnson introduce a basic graph of adoption curves.⁷⁴ (See Figure 5.) The graph consists of three different types of fashion products, which are fads, fashions and basics. The adoption curve showcases the change in which these three types of products increase in sales over a period of time.

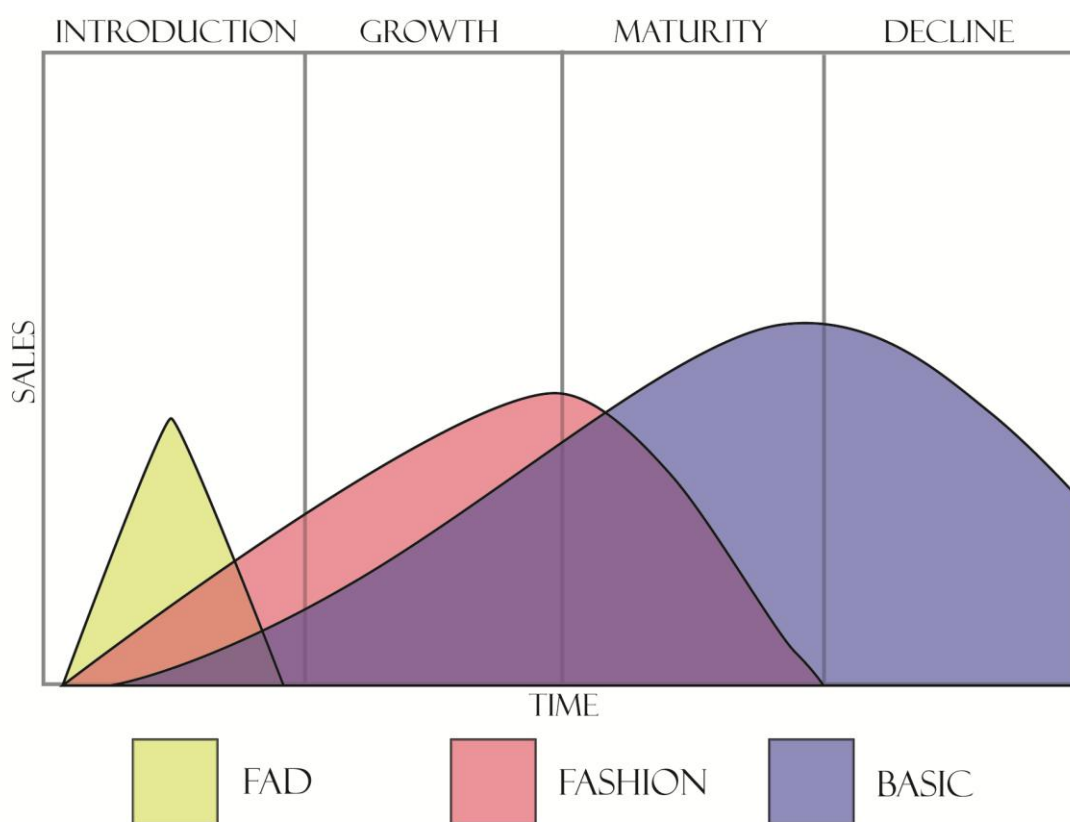


Figure 5. Adoption Curves according to Yurchisin & Johnson (2010), redrawn by the author

From the adoption curve it is easy to distinguish the differences between fads, fashions and basics. Fads, although growing rapidly at first during their introduction, drop suddenly out of style and so their lifespan is quite short. Sproles and Burns define fad as extreme designs that greatly differ from existing fashions that are currently in style⁷⁵. Fashions go through a steadier based curve during the introduction and growth stages

⁷⁴ Yurchisin & Johnson 2010, 7.

⁷⁵ Sproles & Burns 1994, 10.

when also the sales grow gradually. However during maturity sales start to drop when more and more people start to look for the next fashionable items. Basic products then have the most slowly growing curve but consequently their lifespan is the longest. Even when the fashions start to show signs of weakening, the sales of basic products grow all the way through maturity. During the decline stage there is still a slow decline on sales.

There are many studies that suggest that moving away from fashion items to classics would benefit the sustainability, because then people could use the items longer without having a need to throw them away after every single season. It seems that while fashion items go through change quite rapidly, moving from fashion to basic or classic items would slow the consumption patterns within the fashion system. Also Allwood, Laursen, Rodriquez and Bocken discuss the design classics in the article *Weaving a New Future, from Well Dressed?.* According to them more durable styles would help the customers to move away from cheaper fast-fashion products to products with better quality and longer wear.⁷⁶ This way the consumption patterns would shift towards more sustainable ways of consuming where the products stay on fashion longer.

Since the fashion system is ever-changing, it is quite challenging for designers to predict upcoming styles and trends. To help this process, there are many services build upon the forecasting and trendsetting industry which many designers use in their work at least as a reference. Kim, Fiore and Kim explain fashion forecasting in a more detailed manner in *Fashion Trends*, where they acknowledge two different types of forecasting. The first one is a short term forecasting, which has a focus on predicting trends one or two years in advance. The second type of forecasting then focuses on more of a longer term forecasting which predicts trends five or more years in the future. According to Kim, Fiore and Kim the focus of long term forecasts is usually on the fashion industry itself, determining what kind of materials, designs, production and retailing there is going to be in the future.⁷⁷ Although the fashion industry uses short term forecasting when making new collections, it would be better to concentrate on the larger trends that will happen in the future. Sproles and Burns mention that these broader trends relate to the changing

⁷⁶ Allwood, Laursen, Rodriquez & Bocken 2006, 584.

⁷⁷ Kim, Fiore & Kim 2011, 49.

economy, demographic trends, politics, cultural environment and technological development.⁷⁸

2.5. Problems of the fashion system

There are many problems within fashion industry that need to be addressed before it is possible to discuss creating a more sustainable fashion system. Many of the problems have to do with the nature of fashion. Sandy Black discusses the problems of fashion industry in *Eco-Chic the Fashion Paradox* and says that since customers have a desire to be fashionable and constantly change and renew their wardrobe to match their contemporary lifestyles, this habit has created over-consumption and obsolescence⁷⁹. The reason why this kind of consumption is possible is because of the easy access to cheap and disposable fashion. "The fast-fashion business model rests on the ability to capture and respond to shifts in consumer preferences quickly through proximity to fashion markets and fashion makers"⁸⁰. According to Kawamura many consumers think that the problems of fashion industry are created by the marketing tactics that prompt and encourage people to spend more and more money on newest fashions. This point of view does not take into consideration the sociological explanation and the fact that the "fashion system supports stylistic changes in fashion"⁸¹. Those stylistic changes have to do with the aesthetics and the look of fashion garments.

Changes in fashion bring about new innovations to the fashion system that can transform into new trends or even megatrends. While innovation as a term means progress, not all progress is positive, at least not according to Loschek. "Innovation is no more than the fact that today we have something that did not exist yesterday".⁸² While it is good to remember that new innovations are important in order to develop the fashion system even further, there still should exist some kind of tools to help with assessing the causes of those innovations. Holly McQuillan claims that in the majority of products today innovation is limited to aesthetics and to a desire for new things without so much of

⁷⁸ Sproles & Burns 1994, 44-65.

⁷⁹ Black 2011, 17.

⁸⁰ Doeringer & Crean 2006 in McCarthy 2008, 541.

⁸¹ Kawamura 2005, 5.

⁸² Loschek 2009, 89.

consideration for environmental issues and wasting precious resources.⁸³ It is easy to come up with new inventions that concentrate only on one thing especially if that thing is the aesthetics. Such inventions have the potential to dismiss other important elements of good product design, which include functionality, durability and the usage of materials. One example of this kind of "invention" is tearing up readymade jeans already at the production stage. This trend has been growing all the time, without much consideration for its environmental impact. In the process of making jeans, materials are being ruined by tearing holes into perfectly pristine jeans, which will eventually shorten the products' lifecycle and decrease the functionality and durability of the garment pieces. Tearing also makes it more difficult to use other end-of-life strategies to recycle those garments.

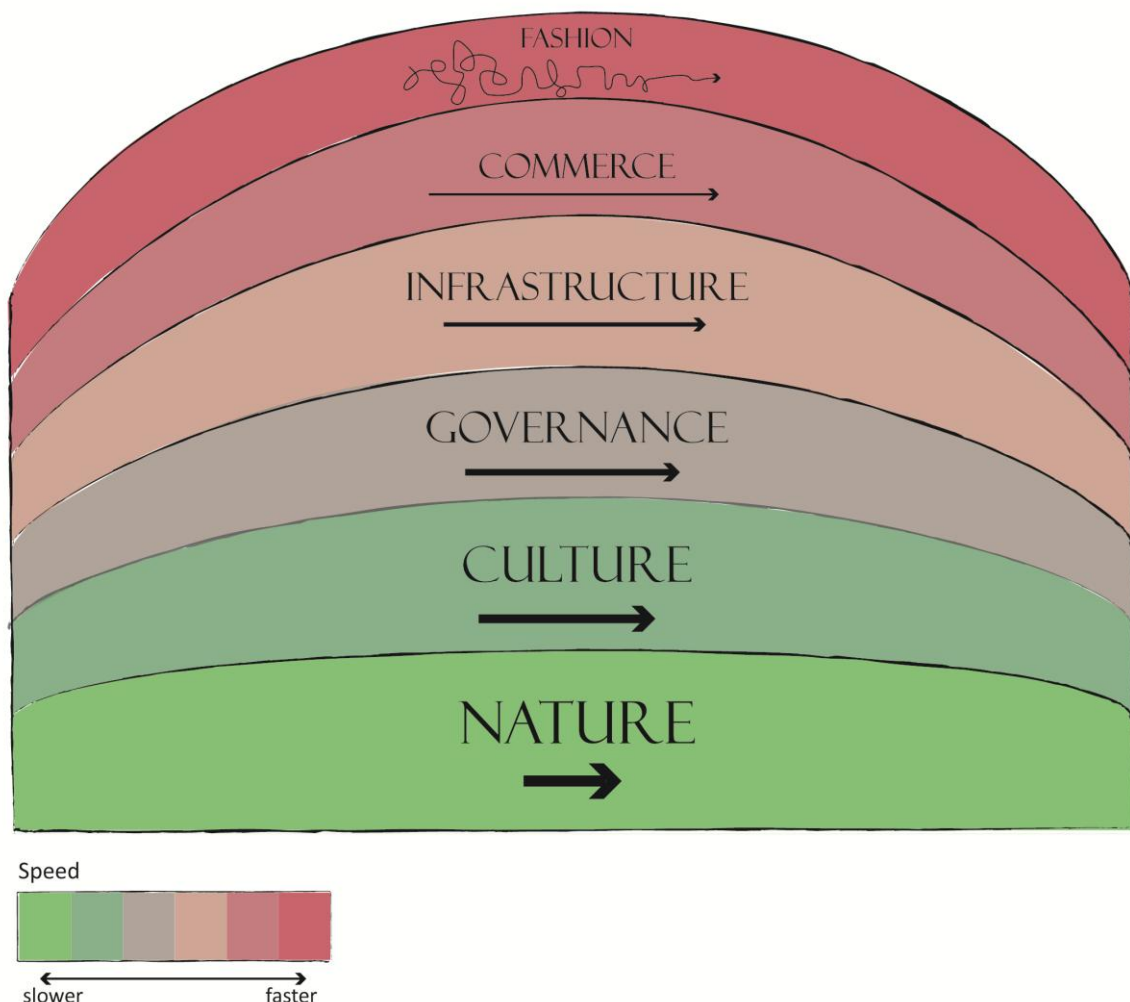


Figure 6. The order of civilization according to Steward Brand (1999) in Strauss, Carolyn (2015), modified by the author

⁸³ McQuillan 2011, 84-85.

Many of the problems of the fashion system today have to do with the fast-paced changes that occur in fashion. In *The Clock of the Long Now* Steward Brand explains different paces of time that are apparent in our culture. (See Figure 6.) According to him our civilization consists of six different paces, the slowest of which are nature and culture. One of the faster layers is fashion, which, while contributing to innovation, can also override the others and create unsustainability. Brand also states that "the layers need to respect other's rhythms" in order for them to provide continuity as a whole.⁸⁴

Overall the problem within people's consumption habits lie in the fact that fashion rarely fulfils the needs of customers. "Fast fashion promotes trends that dress consumers all over the world, producing a homogeneous look that is unlikely to satisfy, for example, the needs of identity and creativity"⁸⁵. Here one can notice a controversy where on the one hand people want to be "part of the group" which then prompts them into buying into the same image. On the other hand, they need to still feel like the fashion reflects their own personality and lifestyle. It is clear that in order for the fashion system to produce fashion that satisfies the needs of customers, there is still a lot of work to be done within the system.

According to Fletcher and Grose, the other problem is that fashion clothing has little perceived value, which is caused by fashion buying and discarding habits⁸⁶. To increase the value of fashion garments there needs to be many changes executed within the fashion industry itself which will eventually start to promote the design of the garments rather than just looks. However, it is not enough to just concentrate on the durability of materials used in the clothing. Fletcher mentions as an example a Scandinavian study in *Sustainable Fashion* where the results showcase that new clothes are bought not because the old ones are worn-out but because of the changes in fashion.⁸⁷ To effectively change the consumption habits and increase the value of clothing customers need to feel like they are buying lasting quality and fashion.

⁸⁴ Brand 1999, 37 in Tham 2012, 217.

⁸⁵ Cataldi, Dickson & Grover 2013, 27.

⁸⁶ Fletcher & Grose 2012, 128.

⁸⁷ Fletcher 2008, 165.

2.6. Fashion theories and sustainability

To understand the relationship between sustainability and change (fashion), one needs to acknowledge the differences and the similarities of those two things. According to Hethorn and Ulasewicz, fashion actually provides "an opportunity of awareness for sustainability".⁸⁸ Thus from the point of view of communication, fashion can be used as a method to make sustainability more visible to consumers. Walker also agrees that fashion may well be a key element in achieving and promoting the sustainability message to broader audience.⁸⁹ In the article *Classics' and Sustainability* David Wolfe writes about the power of fashion and claims that if wider society becomes aware of sustainability efforts and they are conceived as 'chic' and up-to-date, society can change from fast fashion into a more sustainable direction⁹⁰. While the idea of using fashion as a tool to help increase the knowledge about sustainability issues in the fashion industry is clever, the true transition from the fast fashion model takes more efforts in all the stages of garment production. Most of the problems in fashion industry today are actually caused by the complexity of fashion system and the way products are being treated at the end of their life cycle. According to Mathilda Tham unsustainability is consistent thorough the fashion product's life cycle which starts from the design stage and ends within disposal⁹¹. Therefore it is easy to conclude that the problems start at an early stage of designing and, unless we are able to change our ways of thinking, the fashion industry is not likely to change into a more sustainable system.

Although thriving towards sustainability has to start early in the production, a significant part of a garment's footprint is actually caused in the user stage⁹². Besides taking care of clothing, which includes stages such as laundering, dry-tumbling and ironing among others, consumers are also ultimately making the choices to wear and dispose of garments which can contribute to over consumption and generating textile waste. Joan Farrer says that consumers are at the same time hungry for new fashion items, yet they feel responsible for their actions without knowing what to do with it⁹³. In other words

⁸⁸ Hethorn & Ulasewicz 2008, introduction.

⁸⁹ Walker 2006.

⁹⁰ Wolfe 2012, 133.

⁹¹ Tham 2012, 216.

⁹² Fletcher & Grose 2012, 92.

⁹³ Farrer 2011, 21.

most fashion consumers do not know how to consume in a more sustainable way. In design terms, making sustainable consumption easier and more visible might be one solution. It is also possible to have an impact on the use stage of the garments by creating clothing that is easy to take care of and that has potential for a long lasting life cycle.

Oftentimes sustainable products are categorized as durable with the intention of them having an extended life cycle when compared with normal fashion items. However one should note that long life cycles and durability are not necessarily the same thing. While durability in this sense has to do with mechanical qualities, which include durable materials, details and finishes, long life cycles are primarily gained by designing products that people can relate to or, in other words, feel attachment to. Nick Yusuf discusses problems in today's fashion industry and notes that fashion that is made to last longer is still seen as a rarity due to the way those two terms seem to contradict each other. According to him, clothing cannot stand longer wear if the design stage lacks integrity and therefore prohibits from creating a true bond between the user and a product.⁹⁴ According to Wolfe the most obvious way of increasing sustainability in fashion industry is increasing style longevity and the closet-life of garments.⁹⁵ Above all fashion has an incredible power when it comes to creating bonds with consumers given that the design side is in order. After the initial purchase decision the design of the garment has to be strong enough to motivate the user to wear the garment even after changes occur in fashion. In sustainability terms fashion is then the initial attractor, which is necessary to get consumers to buy and wear the product, but after a while the reason for wearing the garment has to be because of the bond that the product and user share together.

Ultimately the main problem lies within the decreased value which according to Kate Fletcher is caused by the combination of fast-paced fashion cycles, increased consumption habits and lower prices⁹⁶. In order to increase the value of fashion items and move towards a more sustainable model the business needs must be met and the products that are being produced must be perceived desirable⁹⁷. The other important factor in achieving sustainable fashion is understanding the issues that are causing the

⁹⁴ Yusuf 2012, 222.

⁹⁵ Wolfe 2012, 133.

⁹⁶ Fletcher 2012, 207.

⁹⁷ Bye 2010, 150.

problems. Jonathan Chapman speaks of this issue in *Emotionally Durable Design* and he thinks that while focusing on the symptoms of wasteful consumption might resolve some problems, ultimately only changing the systems within will bring true change to our consumption habits⁹⁸. While it is true that some issues dealing with consumption issues are caused by consumers, the change has to start from the beginning of the product's life cycle.

2.7. Change and aesthetics of sustainable fashion

The idea of change is well known in the fashion industry which is accustomed to keeping up with the changes in trends and ways of living. According to Gardetti and Torres, change by itself is a neutral element and only in fashion discussion it has a tendency to turn into a negative force especially when fully functional products are being discarded for "purely semiotic or symbolic reasons". Gardetti and Torres also point out that while sustainability has to do with long term solutions, the wasteful production and use of fashion clothing is in conflict with sustainability ideals.⁹⁹ The problem within the concept of change in terms of sustainability is that the process of change inevitably produces waste, at least according to Kaiser¹⁰⁰. While sustainability is in no way against change as long as the change is for the better, there is still a requirement that the amount of utilised resources is gained back during the life-cycle of produced garments. Even so in fashion terms change usually means change in appearance or in other words aesthetics which will usually accelerate wasteful consumption.

Fashion and aesthetics are two elements that coincide within the discussion of clothing design. Already Bell called fashion as "the grand motor force of taste"¹⁰¹ and according to Kawamura fashion reflects taste in general and "it molds our concept of what is beautiful"¹⁰². Joanne Entwistle also adds that fashion is all about changing ideals which has an effect on the designs. These new designs or looks are then marketed as being stylish and in fashion.¹⁰³ While market forces have a certain effect on what is considered

⁹⁸ Chapman 2015, 169.

⁹⁹ Gardetti & Torres 2013, 6.

¹⁰⁰ Kaiser 2008 in Klm, Fiore & Kim 2011, 120.

¹⁰¹ Bell 1976, 89 in Kawamura 2005, 79.

¹⁰² Kawamura 2005, 79.

¹⁰³ Entwistle 2009, 9.

as being in fashion, they are not the only forces that affect aesthetics of clothing. More and more people are influenced by different styles that can inspire changes in aesthetics. Especially in modern society there is an abundance of new styles that bring more diversity to the world of fashion. Postrel refers to this phenomenon as the 'new age of aesthetics'¹⁰⁴. According to her the most visible indicator of this new age is personal appearance which is a fit between individual and social expectations and modern aesthetic standards¹⁰⁵. Reiley and DeLong also point out that this age places more importance on individualism than even before¹⁰⁶. Therefore, while fashion may have an effect on the larger scale of what is considered stylish, there are still different smaller groups that prefer individual aesthetic expression that draws influences from different cultures and social groups.

Fletcher also acknowledges the importance of fashion in terms of its properties that have to do with building relationships and forming new aesthetic ideals but underlines its problems towards sustainability. According to her, the fashion sector still does not pay enough attention to the environment and ethical issues.¹⁰⁷ Especially the wasteful processes of clothing production and fast-changing aesthetic ideals are the main problems why the main fashion sector cannot function without exploitation of goods and people. The key factor in making the change towards more sustainable fashion lies in defining a new standard which takes into consideration both the environmental issues and aesthetics¹⁰⁸. Even if we are to consider making sustainable designs without a fashion component, it is undoubtedly clear that without paying attention to aesthetics of fashion we are not able to create garments that inspire consumers to keep wearing them for longer periods of time.

So it seems that fashion is the key element in clothing design that conveys expressive and aesthetic properties in clothing¹⁰⁹ even though the way fashion and aesthetics have been previously employed to sustainable clothing has been met with varying success. According to Fletcher and Grose most 'eco' garments do not differ in any way from

¹⁰⁴ Postrel 2003, 9.

¹⁰⁵ Postrel 2003, 24.

¹⁰⁶ Reiley & DeLong 2011, 65.

¹⁰⁷ Fletcher 2008, 118.

¹⁰⁸ Baugh 2008 in Kim, Fiore & Kim 2011, 123.

¹⁰⁹ Dunne 2011, 616.

conventionally designed clothing, since sustainability efforts are made invisible. This makes the sustainability issues seem too distant and obscure.¹¹⁰ While it is important to educate and inform consumers about the benefits of sustainably designed products, it is however not necessary to underline just the 'eco' aesthetics and distance eco garments from conventionally designed fashion. One bad example of such distancing was the eco chic movement in the 90's where the message of sustainability was attached to single fibre or colour, which did not convey true sustainability in any way¹¹¹. Another example of this is discussed by Ines Weller in the article *Sustainable Consumption and Production Patterns in the Clothing Sector*. According to Weller, especially within natural fashion movement the use of natural textiles and their properties was the main concern, which ultimately left fashion and aesthetics out of the design process.¹¹² Therefore, in sustainable fashion it is necessary to acknowledge those trends and fashions that have a deeper effect on aesthetics and use them as a point of reference when creating sustainable clothing.

¹¹⁰ Fletcher & Grose 2012, 139.

¹¹¹ Fletcher 2008, 142.

¹¹² Weller 2013, 191.

3. Sustainable design

3.1. The definition of sustainable design

Recently sustainability has become an increasingly more contemporary issue with all things to do with design and its processes, but as a term it was first introduced in the 1950's where its main focus was on social change which related on easing the global poverties¹¹³. Since then many researchers have used the term in their studies. However, the distinctions between different definitions have led to misinterpretation on many parts which is why it is important to understand what sustainability means in the design context and what measures need to be taken in order to achieve it.

The word sustainable means to be able to be maintained, which on its own does not begin to explain the extent we need for a change in society¹¹⁴. One of the most widely acknowledged and used definitions is most likely the one stated in the Brundtland report written in 1987. According to the report "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".¹¹⁵ Sustainable development in this definition acts as an umbrella term that consists of every practice that has to do with sustainability. Such areas include agriculture, transportation, industry and politics. To put it shortly, it has to do with all aspects of society.¹¹⁶

There are also several other terms that are used to describe sustainability. One of the most frequent terms and its variations are probably 'ecology', 'ecological' and the shortened version 'eco'. Sue Thomas writes that the term was first used in the 1980's¹¹⁷ and according to the Oxford English Dictionary it means being connected with the environment¹¹⁸. Other commonly used terms are environmental, green and ethical. According to Thomas some of these terms have been used interchangeably especially in

¹¹³ Farrer 2011, 20.

¹¹⁴ McLennan 2004, 2-3.

¹¹⁵ Report of the World Commission on Environment and Development: Our Common Future 1987, 41.

¹¹⁶ McLennan 2004, 3.

¹¹⁷ Thomas 2008, 531.

¹¹⁸ Oxford English Dictionary 2010.

the context of clothing in the attempt to underline that the production and manufacture does not harm the environment.¹¹⁹

Joan Farrer introduces one of the most easily visualized description of sustainable design and uses the milking stool as a metaphor for sustainability. The stool has three legs which stand for people, profit and planet. The seat represents the sustainable platform. If even one of the legs is defective then sustainability is not truly fulfilled.¹²⁰ Like in Joan Farrer's metaphor, sustainability is most commonly defined by three categories which are environmental sustainability, financial sustainability and ethical sustainability. This theory is called the triple bottom line¹²¹ and it is visualized in Figure 7. These terms may vary in different studies but the core and the meaning of them still stays the same.

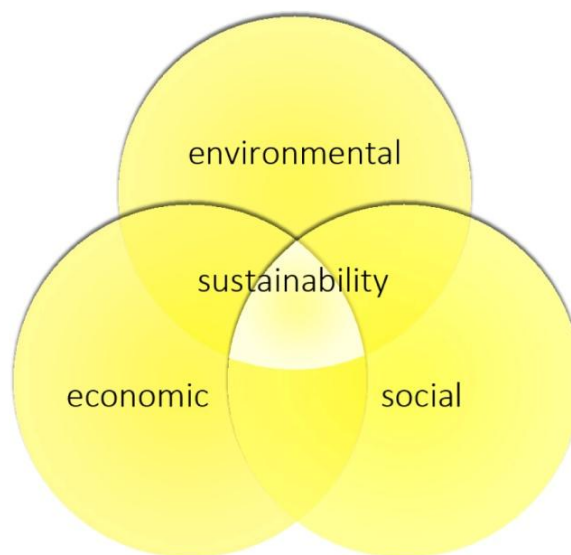


Figure 7. The triple bottom line according to Holmstrand (2012), drawn by the author

The first and perhaps the most commonly known category of the triple bottom line is environmental sustainability which in the context of designing new objects is increasingly

¹¹⁹ Thomas 2008, 531.

¹²⁰ Farrer 2011, 20.

¹²¹ Holmstrand 2012.

crucial to being able to sustain life on Earth in the future. According to Global Footprint Network's assessment, the renewable resources for 2014 had already been used up for the entire year and after August 19th the human population was consuming over its capacity. The calculation was based on a complex algorithm that looks into the overall climate emissions, used land for cultivation and pasture, fishing, woodland and areas that have been built.¹²² Still in modern society environmental resources are used well beyond the point that is nowhere near the sustainable standards of living and consuming. Although we do not have a perfect model for creating products that are sustainable, according to Alison Gwilt the objective must be to focus on the positive impacts and minimize the negative causes of product development¹²³. Therefore, if we try to minimize the environmental impacts of the production stage and focus on creating better products that will last longer, we are moving towards a more environmentally sustainable system even if all the problems of production are still not quite resolved.

Social sustainability then is accomplished by treating people ethically. In the design context this can be accomplished in two different ways. First is the production line where all the people involved in production should be treated fairly and paid accordingly without creating any poverties. The second point of view is derived from the usage of products where ethical concerns have to do with creating wellbeing among people who are using the product. In this case, if the product does not accomplish certain standards of usability or if it is for example too expensive for people to buy and creates social anxiety, it does not fulfil the requirements of social sustainability. In a perfect world all products would function properly and increase social equity, but, since such a world has not been reached, all we can do as designers is be more interested in the production line and try to make better products that would increase social wellbeing from production all the way to the end-user.

Besides environmental and social sustainability, the third category in achieving a balanced sustainable system is financial sustainability. In financial sustainability the main idea is that companies must create enough income to be able to continue running and to be able to pay a sufficient salary to their workers. While taking care of what goes on inside the

¹²² Kokkonen 2014.

¹²³ Gwilt 2011, 69.

business, companies should also give something back to society for example in the form of donations. Only by giving back as much as possible can financial sustainability be achieved.

If we consider finances from a business point of view, most of the practices used today concentrate only on making more profits without actually giving much back. Sometimes the financial side of business also acts against sustainability in the sense that the profitability and pay-off of certain products is not sufficient even though design-wise the products would be more sustainable in the long run. Fletcher and Grose discuss the same idea in *Fashion & Sustainability* where they mention that certain product initiatives are discarded in the product development stage for being too expensive even though actually they would save money and effort ultimately even more than some of the easier solutions.¹²⁴ Some of the businesses today concentrate too much on the immediate gratification and reject ideas that seem more expensive, even though they are much more sustainable solutions even for the economy. This is because of the short-sightedness of their practices and not being able to think things through holistically with a bigger picture in mind. Also it would appear that there is a belief that if products are used until they are no longer usable due to long wear it would somehow be a negative outcome for the economy. According to Evelyn Brannon, companies are faced with the conflict of "what is good for the environment and what is good for the economy" which as a point of view is too narrow and very rarely results in sustainable outcomes¹²⁵.

While the triple bottom line tries to explain the different aspects of sustainability in a clearer way, some researchers feel that it fails in conveying the complexity of the term and how sustainability actually works in real life. Such contrasting views have been presented by Gilding, Ehrenfeld, Suzuki and Dressel.¹²⁶ The main argument of these researchers is that in order to design sustainably the designer has to perceive the world differently from what we are used to. By doing so one can truly satisfy the basic human needs and make an effort towards a more sustainable future. Also Simonetta Carbonaro writes about the incomplete structure of the triple bottom line in the article *The Design of a New Prosperity*. According to her, sustainability theories lack the cultural point of view

¹²⁴ Fletcher & Grose 2012, 121.

¹²⁵ Brannon 2010, 201.

¹²⁶ Gilding 2000; Ehrenfeld 1999; Suzuki & Dressel 2002 in Gardetti & Torres 2013, 3.

that has to do with social change and what we consider meaningful and beautiful. She also claims that "If we do not embed culture into sustainability, and, vice versa, embed sustainability into culture, we are unlikely ever to be able to create a new model of real prosperity".¹²⁷ One part of making a change is educating people about sustainability issues. According to Alastair Fuad-Luke, sustainability should be considered as a cooperative and social ambition, which requires much more universal awareness before we can partake that road¹²⁸. The responsibility of sustainability should be on everyone, with designers as a forefront providing more information about the issues and having a positive effect on the society in that manner.

Stuart Walker refers to sustainable development as a myth which according to him essentially means that the humankind is not likely ever to reach it¹²⁹. As of today sustainability is not being achieved in any field of business or enterprise and some have even suggested that it never will. According to Chapman and Gant, sustainability is an "absolute" term which can result in thinking that one either is or is not sustainable, where there is no middle ground¹³⁰. Using this kind of linear paradigm is not enough when considering the effects of different practices. While certain processes always have some sort of impacts, whether it is recycling, manufacturing or using, we must take a more holistic point of view which will provide a deeper understanding of the issues concerning sustainability that cannot be achieved by focusing just on smaller things. Chapman and Gant introduce a view of degrees of sustainability in *Designers, visionaries and other stories : a collection of sustainable design essays*. According to them, instead of focusing on the idea of 100 percent sustainability it is more beneficial to ask questions such as "'how sustainable is it?'; 'How sustainable could it be?' and 'How can we make it more sustainable?'"¹³¹.

While discussing the levels of sustainability is one way of achieving a more sustainable future, there are already processes in this world that are functioning within sustainability. If we take a look at nature, we can discover processes which work within sustainability,

¹²⁷ Carbonaro 2012, 48.

¹²⁸ Fuad-Luke 2007, 37.

¹²⁹ Walker 2006, 16-18.

¹³⁰ Chapman & Gant 2007, 8.

¹³¹ Chapman & Gant 2007, 8.

meaning that the whole natural system is a holistically functioning system that will sustain itself as long as it is left alone to do its processes and not disturbed in any way. Some sustainability agendas today have been moving closer to that of a natural system in order to achieve practices that are more sustainable. Although this is only the beginning on the long path towards a more sustainable society. One way of moving forward was already suggested in the Brundtland report, where it was stated that designing new strategies that would help to move away from the destructive methods into ones that provide more chances of growth and development within nations plays a key element in achieving sustainability¹³².

3.2. Sustainable design in practice

Design in the context of sustainability is regarded as an integral part of making better choices and helping the sustainability causes. One could question, why is design such an integral part in creating sustainability? According to the Design Council's *Annual Review 2002*, up to 80% of a product's environmental cost is determined by design¹³³. While such a huge percentage of a product's entire environmental cost is determined already in the design stage, it is easy to conclude that design actually plays a significant role in achieving sustainability. Some researchers have gone as far to suggest that with sustainable design we may not even have to change our consuming habits. One of those views was presented by McDonough and Braungart and they argue that as long as we are able to change our products and other systems we may not have to do with less in order live sustainably.¹³⁴ Whether that is true, remains to be seen, but the main idea still remains the same that sustainable design possesses possibilities that we have not yet foreseen and in the future that may be our saving grace when dealing with climate change and ethical issues.

Design by its definition refers to both product and process which according to Janice Ellinwood is a tangible solution that is both visual and functional in nature¹³⁵. While sustainable design should have an effect to both product and process, the emphasis of it

¹³² Report of the World Commission on Environment and Development: Our Common Future 1987, 45.

¹³³ Design Council Annual Review 2002, 17 in Tham 2012, 217.

¹³⁴ McDonough & Braungart 2002.

¹³⁵ Ellinwood 2011, 1.

is more on the process side of design. Jonathan Chapman discusses current design practices and ways to improve them in *Emotionally Durable Design* and according to him design is an initiative especially found in human phenomena that ultimately shapes and modifies our culture¹³⁶. While design is mostly considered a human characteristic, it is clear that design has the power to change our conceptions and view of the world. That is also part of the reason why design is such an important part of sustainability, and why it is crucial to use it to our advantage when creating new products. Clare Brass and Flora Bowden mention that design has an effect on our behaviour and it can facilitate connections we make with other people¹³⁷. In a way design acts as a medium by which we connect and interact with each other whether we realize it or not. This is well exemplified by smartphones which we use to interact with other users on social media. The design product (in this case the phone) and the services related to the product make it possible for us to communicate with other people.

According to Chapman and Gant "Design is a needed, necessary and valuable process of invention and innovation, with the potential to take us closer to a sustainable society"¹³⁸. This claim involves the assumption that we are aware of the things that make for good design decisions. One of the ways we can get better results is understanding the theory behind sustainable design, which according to Loschek is a factor that may increase the value of our design¹³⁹. Walker adds that in order for new ideas to be successful we need to be educated in areas which will go "beyond the traditional boundaries of design"¹⁴⁰. Often instead of trying to force sustainability ideals into existing manufacturing systems designers should focus on designing products that are compatible with sustainability¹⁴¹. Other values relating to good designs are those that result in lasting value. Carlson claims that when products are affective, narrative and enhance our life style and identity, they are designed in a way that have a possibility to make a real difference in the world¹⁴². It should also be noted that some qualities that make a product valuable and desirable initially may change after a while, which in sustainability context means loss in value.

¹³⁶ Chapman 2015, 8.

¹³⁷ Brass & Bowden 2012, 111.

¹³⁸ Chapman & Gant 2007, 7.

¹³⁹ Loschek 2009, 7.

¹⁴⁰ Walker 2006, 12.

¹⁴¹ Walker 2006, 30.

¹⁴² Carlson 2012 in Mouwitz 2013, 7.

According to Walker, especially functionality and aesthetics of products diminish very easily over time¹⁴³. That is why designers should pay more attention to creating lasting value which would increase the life of products.

According to Chapman, design is based on different forms of knowledge including economic, social, medical and cultural, to mention a few. Design as a practice then involves indentifying the problems of earlier advances and attempting to improve them further.¹⁴⁴ There is no point in going back if we are aware of the faults of earlier designs even though innovating all together new concepts may seem too risky at the early stages of product development. There is also no point in denying the fact that not all designs may work within their context and sometimes they may even be total failures to begin with. Even with mistakes there is still promise and at least that way the overall design work will be moving forward. Jason McLennan agrees and writes in *The Philosophy of Sustainable Design* that "sustainable design requires doing things differently" whether the field of design has to do with architecture or industrial design¹⁴⁵.

In sustainable design one important step is determining the quality of design work in order to get a better picture of processes that could be still developed further. There are some well-known practices that increase the quality of design products and services. In the design field, measures of quality have been already established and usually they concern the visual and functional side of design. According to Loschek, also communicative criteria should be taken into consideration besides the aforementioned two criteria¹⁴⁶. While this method of determining the quality of design may have worked in the traditional sense, within sustainable design it still lacks important components. In a sense sustainability should mean superior design quality¹⁴⁷ and the means to accomplish it should be diverse. According to McLennan, one of the practices that could potentially have an effect on design is increasing the amount of collaboration between different people to help the design process.¹⁴⁸ When working with people from different fields of expertise or with different point of views the innovation process within sustainable design

¹⁴³ Walker 2007, 69.

¹⁴⁴ Chapman 2015, 9.

¹⁴⁵ McLennan 2004, 211.

¹⁴⁶ Loschek 2009, 173.

¹⁴⁷ Palomo-Lovinski & Hahn 2014, 99.

¹⁴⁸ McLennan 2004, 212.

is likely to be much more fruitful towards creating new ideas and concepts. Also working in collaboration with different partners increases the levels of information and knowledge that go into the process which will help in discovering better solutions and preventing mistakes. That being said, often designers also work alongside consumers to make the end result function better in real life situations.

There are still some misconceptions concerning sustainable design that are causing people to question its usability in different design contexts. In the traditional and current design structure the aim of product development is to manufacture "an attractive product that is affordable, meets regulations, performs well enough, and lasts long enough to meet market expectations"¹⁴⁹. Therefore, the production that makes profit is preferred which does not necessarily take into consideration sustainability issues. In the article *Fashion Design Industry Impressions of Current Sustainable Practices* Noël Palomo-Lovinski and Kim Hahn discuss some of the viewpoints that are suggested in the environmental philosophy of Ecological Modernization. According to them, adapting current design and business practices to sustainable design is not a viable option, since that would result in the business making less profit and consumers having less choice.¹⁵⁰ A popular view is that sustainability is somehow a more costly approach compared to the regular design practice. It seems that while sustainable approaches may take more time and resources in the initial stages of product development that somehow that reflects also on the expenses of the actual products. Viktor Papanek writes that against common beliefs there are no conflicts between sustainability and business or sustainability and aesthetics, since all the relationships between those things are dynamic¹⁵¹. Keeping this in mind it is easier to customize the levels of commitment to sustainability while still producing new designs within market forces.

However, even with this theory in mind sustainable design may prove to be problematic especially if the focus is on the problems of current system. Chapman points out that there is "a tendency focus on the symptoms of the ecological crisis rather than the actual causes" which is slowing down the actual development of sustainability agendas¹⁵².

¹⁴⁹ McDonough & Braungart 2002, 37.

¹⁵⁰ Palomo-Lovinski & Hahn 2014, 91.

¹⁵¹ Papanek 1985 in Grose 2013, 55.

¹⁵² Chapman 2015, 15.

McDonough and Braungart speak of the matter as "a strategy of tragedy versus a strategy of change"¹⁵³. The first strategy refers to the problem solving strategies where the aim is to lessen the impacts of unsustainable practices. These strategies include things such as recycling, downcycling and other potential waste management strategies. The second strategy then has to do with changing the systems within, which would eliminate the need to resolve the occurring problems altogether. Still today the majority of approaches in the design field are using the first strategy which will not have positive effects on the environment, economy or the society in the long run. McDonough and Braungart use eco-efficiency as a good example of the first strategy, where despite the good concept it does not solve any problems because it is working within the same system that is the source of all problems. At best it merely slows down the effects.¹⁵⁴ Also Stuart Walker writes of this issue in *Sustainable by Design, Explorations in Theory and Practice*. He reminds that while design is all about exploration of new things, we should still pay attention to the new evolving contexts without forgetting the baggage from previous ones.¹⁵⁵ This essentially means that not all new is necessarily for better and without finding solutions to previous issues and problems we cannot create sustainable systems of practice.

Currently many practices within the design field concentrate on one way production model where the goal is to produce products without giving much thought to what happens to them after their lifespan with the initial user is over. Walker lists different factors that lead to product obsolescence in *Sustainable by Design* which are disposability, wear, non-repairable, functional obsolescence, technological obsolescence and aesthetic obsolescence¹⁵⁶. At product level something as trivial as technological issues or the fact that the product cannot be repaired will lead to disposing. From a designer's point of view some of these factors leading to obsolescence are almost impossible to predict due to new advances in technology and innovations. By ensuring that products are well-made and functional can designers still prolong the life of products. As an act to change the one way production model currently in use in the design field, many researchers speak of life-cycle thinking and cradle-to-cradle models

¹⁵³ McDonough & Braungart 2002, 42-44.

¹⁵⁴ McDonough & Braungart 2002, 61-62.

¹⁵⁵ Walker 2006, 31.

¹⁵⁶ Walker 2006, 140.

which take into consideration what happens after the use phase to the product. According to Fletcher and Grose, life-cycle thinking aims to improve sustainability of a product through how it is made, used and disposed of¹⁵⁷. Hethorn and Ulasewicz add that cradle-to-cradle is built upon cradle-to-grave metaphor with the intention of creating even more innovative and high-quality products to increase well-being of both nature and culture¹⁵⁸. Cradle-to-cradle goes even further where the entire loop of product's life-cycle and the following ones as well are being considered at the design stage. McDonough's and Braungart's book *Cradle to cradle: Remaking the Way We Make Things* concerns with aspects of new design thinking that is more sustainable and holistic in its approach. According to McDonough and Braungart, the success of sustainable design depends on how well we are able to incorporate cradle-to-cradle system and eliminate waste as a concept.¹⁵⁹ In the cradle-to-cradle model the discarded product becomes material for a new product completing the cycle without any waste. In order to make the transition to the cradle-to-cradle model the design of a product should take into consideration not only how it is made but who is going to be using it and how. McDonough and Braungart also point out that in cradle-to-cradle there might be several users and ways to use a certain product over a long period of time.¹⁶⁰

3.3. Fashion design in the context of sustainability

Sproles and Burns define the term 'fashion design' as a "unique combination of silhouette, construction, fabric, and details that distinguishes a single fashion object from all other objects of the same category or class". They also add that possible designs cannot be counted, since there are an infinite number of possibilities different garments can be put together.¹⁶¹ According to Ellinwood, the fashion element in design is more concerned about aesthetics than function in general¹⁶². In the context of sustainability these definitions are not extensive enough, since they concern only with the aesthetic qualities of design. In a larger context, design has to do with the way it makes us people feel, how it functions and aids us in everyday settings and whether it has the potential to

¹⁵⁷ Fletcher & Grose 2012, 92.

¹⁵⁸ Hethorn & Ulasewicz 2008, 155.

¹⁵⁹ McDonough & Braungart 2002, 103-104.

¹⁶⁰ McDonough & Braungart 2002, 139.

¹⁶¹ Sproles & Burns 1994, 6.

¹⁶² Ellinwood 2011, 1.

satisfy our basic needs. George Nelson summarizes the pursuit of design as "the way things give meaning and relevance to the human experience".¹⁶³ In the fashion context this meaning and relevance is even more enhanced since clothing and fashion are always a part of our being. From a designer's point of view design means solving material problems and creating connections between people.¹⁶⁴

In the fashion context, sustainability is still partly seen as an extra value that is usually derived from small fragments that actually have no real effect in competing with the real causes. Today many designers associate sustainability to environmental and ethical aspects of producing a garment. However, according to Hethorn and Ulasewicz, sustainability in the fashion context is more of a holistic approach that does not merely look at the fibre content of the clothing. It has more to do with the whole process of enhancing the well-being of people and environment.¹⁶⁵ The naive view where sustainability is only attached to materials or to another small part of the design process not only dismisses the actual theory behind sustainability but also overlooks the power of design that actually has the potential to have the most comprehensive effect on the sustainable qualities a single fashion garment. Also Alison Gwilt agrees that sustainability is too often just an afterthought, and only after the product development stage is on its final stages some aspects of sustainability are being introduced as a part of the solution¹⁶⁶. Instead of such practice designers should use a more holistic approach that reflects on the whole fashion system. Hethorn and Ulasewicz suggest that the environmental impacts should be taken into account in all stages that clothing go through including growing and material stages, design, production, transport, use and disposal¹⁶⁷. Thus until recently a part of the problem in the fashion industry has been the lack of understanding of what sustainability efforts actually mean in practice.

What comes to the discussion about material issues, most of the practices used today are not contributing much to sustainability in the fashion system. According to Sass Brown the focus in sustainable design should be on finding better solutions to using different

¹⁶³ Nelson 2003 in Hethorn & Ulasewicz 2008, 65.

¹⁶⁴ Brass & Bowden 2012, 108.

¹⁶⁵ Hethorn & Ulasewicz 2008, introduction.

¹⁶⁶ Gwilt 2011, 69.

¹⁶⁷ Hethorn & Ulasewicz 2008 in Jack 2013, 125-126.

kind of materials and resources. Rather than using ecological fibres, designers should attempt to locate waste materials which are the result of fashion's unsustainable practices.¹⁶⁸ While this kind of practice is becoming more and more popular with the rise of new designers and their use of design strategies such as upcycling, there are also other tactics that are being employed in the textile industry. If we look at current problems in the fashion industry, the main difficulty in using textile materials in a more sustainable way is that different fibres are mixed together. For recycling purposes materials need to be processed again, which means that we have to be able to separate most fibres which often proves to be more difficult and costly than opting for virgin materials. If, however, the process can be done, usually the quality of the end textile has decreased during the process, not to mention all the resources that went into the recycling process. In the end we are faced with the dilemma of whether the processes are actually beneficial for the environment and whether we are actually decreasing the quality of the end product in the process.

The design field can provide alternatives for reusing materials in a more sustainable way. First of all, we can design products that are easy to disassembly and recycle¹⁶⁹. Secondly, Black mentions an alternative, where the focus is on fabrics that are suited for their designs and last use for a longer period of time. This means that designers pay more attention to the care element of clothing in order to provide durable products to the consumers.¹⁷⁰ While such practices may prolong the life-cycle of certain products and diminish the textile waste problems, most of these material solutions are still considered short term solutions that only concentrate on symptoms rather than the causes. The larger issue, according to Fletcher, is that the fashion and textile sector lack the attention to moral and environmental issues. She also argues that while some of the companies or trends in fashion claim that they are environmentally sustainable in their use of materials and practices they actually do not reflect on the real values that sustainability has.¹⁷¹

¹⁶⁸ Brown 2013, 130.

¹⁶⁹ Brass & Bowden 2012, 110.

¹⁷⁰ Black 2011, 59.

¹⁷¹ Fletcher 2008, 118-119.

In order to create sustainable fashion design the focus must be on bringing more value and satisfaction of human needs in today's society. According to Gardetti and Torres, especially design, research and development are segments that add overall value to fashion garments.¹⁷² While increasing the knowledge of sustainability in all of those areas and using some actual methods in theory we can be sure that design wise the quality will get better in time. Simonetta Carbonaro writes in the *article The Design of a New Prosperity* about new approaches to sustainable design. According to her, it is not enough to focus just on promoting sustainable lifestyles. Instead she speaks of creating new meanings and ways of thinking within fashion design that will develop the industry from within.¹⁷³ According to Fletcher this could be accomplished through coherent sustainable politics in fashion. Through this kind of practice the industry would be able to change the systems of production, consumption and aesthetics and base those systems on sustainability values.¹⁷⁴ It is clear that not only the fashion system but all fields of design have to go through some sort of shift towards sustainability ideals that most likely means that a lot of things have to be changed. Some examples of this kind of new thinking and changing design systems could be introducing life-cycle thinking, redesigning the ownership of material items and designing for end-of-life strategies. Brass and Bowden speak of totally new visions for the future, where designing is not focused just on products but ways of doing things. These things include new service systems that operate on the basis of hiring and sharing with other consumers.¹⁷⁵

In the article *To make clothes that matter - From tradition to new design aesthetics*, Pia Mouwitz writes about values that are essential in sustainable fashion design. Mouwitz notes that the way we can get more knowledge about value and design is mainly through aesthetics.¹⁷⁶ This does not necessarily mean that it is possible to point straight to the elements that bring value to the design. According to Postrel, it is useless trying to find some kind of coherence or truth from aesthetic expression¹⁷⁷. What is valuable to one is not necessarily valuable to another. In design work it is necessary to bring different

¹⁷² Gardetti & Torres 2013, 4.

¹⁷³ Carbonaro 2012, 49.

¹⁷⁴ Fletcher 2012, 210.

¹⁷⁵ Brass & Bowden 2012, 111.

¹⁷⁶ Mouwitz 2013, 5.

¹⁷⁷ Postrel 2003, 10.

possibilities of value ways for users to identify with different products in a personal way. Through aesthetics we can however attach different emotions to the products and that way create meaning and value. According to her, most values relating to fashion garments are hidden which means there are no visible cues that point to the fact that the garment in question is meaningful to its user¹⁷⁸. These values rise from the relationship between the clothing and the body and the capacity of fashion that enables us to express ourselves and our identity through our appearance¹⁷⁹. In design terms it is important to know how to add certain values to clothing which will increase the sustainability of the designs. This can be accomplished by adding interaction between clothing and society via increasing emotional value, design longevity and versatility, quality and craftsmanship and uniqueness to mention a few¹⁸⁰. Ultimately, what dictates the values of clothing are the consumers since they are the ones that have the strongest relationships and closest bond with design products.

According to Walker, moving towards more of a sustainable system requires a considerable amount of innovation, change and creativity¹⁸¹. In *The Aesthetics of Imagination in Design* Mads Folkmann discusses the possibilities of innovation and imagination in the design field and concludes that imagination is essential to design work which will provide us with new directions and possibilities via visually oriented abstractions¹⁸². "The role of imagination is to transform meaning."¹⁸³ In fashion design imagination plays a significant part in the creation of different designs and it can relate to either visual or functional side of clothing design. Without imagination new innovations are not likely to happen at least in the sense that they would completely revolutionize the design field. Also Loschek talks about innovations that are occurring within the fashion system. These innovations can be stylistic, idealistic or conceptual. Innovations can also take two routes: one being creative destruction and the other sustaining continuity in a new previously unearthed way.¹⁸⁴ Creative destruction is directed at completely changing previous ways of thinking while the second approach is about finding new ways of linking,

¹⁷⁸ Mouwitz 2013, 6.

¹⁷⁹ Hethorn 2008, 53.

¹⁸⁰ Mouwitz 2013, 8-10.

¹⁸¹ Walker 2006, 74.

¹⁸² Folkmann 2013, 67.

¹⁸³ Folkmann 2013, 82.

¹⁸⁴ Loschek 2009, 100.

for example sustainable practices into traditional product design. While both approaches can be useful in the creation of new innovations, the most important part is to remember to think about the effects of those innovations in relation to sustainability ideals.

There has been some speculation whether all innovations are actually beneficial to sustainability efforts or even to the development of design field. Black claims that novelty in some cases can be done just for its own sake especially in fashion and other product design industries¹⁸⁵. Innovation has also been blamed for creating obsolescence¹⁸⁶. Also Walker acknowledges that over excessive emphasis on innovation can be damaging to people and to the environment¹⁸⁷. Where then is the line between what innovation is good and what is bad? Answering the question is usually very difficult due to the effects products will have over the course of their use phase and disposal. Often the feedback on defected innovations comes late, which means that there is not much to be done for the designs at that point trying to save them. To prevent this from happening, the key for success lies in preparation and holistic design practice.

Some design practitioners have suggested that in order to design sustainable products we should move our practices closer to nature and its ecosystems. Fletcher writes that the necessary qualities found in nature are efficiency, cooperation and symbiosis¹⁸⁸. While a total transition to this kind of model will be unnecessary and impossible that does not mean that we cannot learn anything from it. Especially in the fashion industry there is a certain need for diversity, where there is "no single one-size-fits-all solution, but multiple design opportunities working at different scales, levels, timeframes and with many different people"¹⁸⁹.

There are many reason as to why sustainability and fashion issues have clashed before. Firstly, the fashion supply chain and its complexity has made handling any environmental issues very difficult¹⁹⁰. When an industry handles such huge volumes of textiles, employs so many workers in different stages and locations of production and functions globally it

¹⁸⁵ Black 2012, 75.

¹⁸⁶ Wood 2007, 104.

¹⁸⁷ Walker 2006, 73.

¹⁸⁸ Fletcher 2007, 122.

¹⁸⁹ Fletcher 2007, 122.

¹⁹⁰ Black & Eckert 2012, 92.

is almost impossible to know what is actually transpiring. Who can pinpoint the sources of problems in the production of fashion goods and dictate what needs to be done? Like in anything, the problems in the fashion industry are not few but they are multiplied in different stages and trickling down. Holly McQuillan writes that we need a new system which is flexible and able to change without having such a great impact on the environment and people working within fashion sector¹⁹¹. Also Kate Fletcher discusses the matter of fashion sector in the *Routledge Handbook of Sustainability and Fashion*. According to her, the solution to the problems we face today could be solved if we "broaden the agenda for fashion beyond production and consumption of new clothes" and gain an understanding of the bigger picture of the whole situation.¹⁹² The second problem has to do with the way fashion and sustainability have been perceived as opposite forces. Black emphasizes that it is important for sustainable fashion to meet our personal and symbolic needs¹⁹³. Currently many practices refuse to acknowledge that there are positive effects to fashion. Those positive effects have to do with delighting and giving us pleasure and to include sustainability into the system gives us the opportunity to meet our true needs¹⁹⁴. Why the positives are forgotten in the discussion concerning sustainable fashion is probably due to previous attempts that were made in the early 90's. A good example of such badly perceived attempts is eco chic, which, in a sense, tried to bring the sustainable element into fashion. According to Fletcher eco chic was based on simple reduced visual image where sustainability was handled as an afterthought¹⁹⁵. Eco chic did not truly reflect the values of sustainability but relied on superficial beauty, consumption patterns and did nothing to change industry's structures for better¹⁹⁶.

Today's sustainable fashion is often translated into slow fashion. As a term the prefix 'slow' in slow fashion is not simply a description of speed. According to Fletcher and Grose it "represents a different world view that names a coherent set of fashion activity to promote the pleasure of variety, the multiplicity and the cultural significance of fashion

¹⁹¹ McQuillan 2011, 96.

¹⁹² Fletcher 2015, 20.

¹⁹³ Black 2012, 8.

¹⁹⁴ Fletcher 2012, 210.

¹⁹⁵ Fletcher 2008, 119.

¹⁹⁶ Fletcher 2007, 120.

within biophysical limits"¹⁹⁷. These limits are nearer to those of nature, where instead of fixating on speed the cycle is slower and evidently more sustainable. Also Gardetti and Torres describe slow fashion in terms of what kind of relationships it fosters. According to them, it is dependent on creating bonds between people and the environment.¹⁹⁸ In a way slow fashion can be seen as a countertrend to fast fashion and in short it means quality over quantity¹⁹⁹. In the article *Collision of Fast and Slow*, qualities such as persistence and durability are seen as features of slow fashion with the addition of exquisite craftsmanship²⁰⁰. The quality is a key point in slow fashion since it is one of the most likely attributes that make clothing last longer in use. While slow fashion may have better quality than other fashion garments it is not necessarily a possible option for all the consumers. According to Evelyn Brannon slow fashion may not be the choice for fashion followers who are more accustomed to buying and discarding quickly²⁰¹.

3.4. Durability and emotional design

Within sustainable design there is an on-going discussion about the durability of products and how it is affecting sustainability. Before proceeding to an in-depth discussion on the subject, it is necessary to define what the term 'durability' means in this context. In laymen's terms durability means actual durability of the materials from which the products are made of. Fletcher and Grose write that whether we use the term 'lifespan' or 'durability', they are almost automatically understood meaning the physical phenomenon²⁰². In sustainable design the term is understood in a more extensive way that not only takes into consideration the durability of materials, but also other qualities of design products. Fletcher and Grose actually point out that in terms of sustainability physical durability is seen as a bad solution, since especially in the fashion field discarded items are usually indicators of failed relationships rather than poor physical qualities of products²⁰³. Therefore, in sustainable design the term durability has to do first and

¹⁹⁷ Fletcher & Grose 2012, 128.

¹⁹⁸ Gardetti & Torres 2013, 23.

¹⁹⁹ Bye 2010, 150.

²⁰⁰ Zheng & Wang 2012, 116.

²⁰¹ Brannon 2010, 28.

²⁰² Fletcher & Grose 2012, 85.

²⁰³ Fletcher & Grose 2012, 85.

foremost with creating relationships between the user and the product which will in the long run extend the life of the product.

Another term used to describe durability is 'enduring objects', which essentially differs from durability in the sense that it is more commonly used with objects that stand the test of time due to their usefulness. Walker distinguishes three possible variations of enduring objects which are: functional, social/positional and inspirational/spiritual. According to Walker, these objects have the potential to be sustainable since they correspond with certain human needs.²⁰⁴ In terms of research, enduring objects have been found in all cultures throughout time and they have an important purpose, which makes them necessary artefacts. When we consider the categories of enduring objects it is possible to find some similarities in the design field that could potentially help durability efforts. For example, in the fashion and clothing industry garments have the potential to be functional, when they are connected to certain situations that require extreme functionality, especially found in relation to work wear. Social enduring can be achieved with fashion that sends signals to other people regarding its wearer's position and standing in society. Clothing can also be inspirational and spiritual when it is perceived in such a way which relates very closely to personal aspirations and views.

Often in the design context designers speak of emotionally durable design, which according to Chapman is about exploration of creating deeper bonds between people and material things. The aim of emotional durable design is then to reduce the consumption and waste that is being created in the process.²⁰⁵ With better products that people can relate to and feel like their own, it is less likely that those products get thrown away as fast as conventional products which will ultimately decrease the need to continue buying new products in the same category. The consumption will also have an effect on the amount of waste both in the production stage and at the end of life of the products. According to Chapman, waste can be seen as a symptom of a failed relationship²⁰⁶, which is bad for the environment and the society. Also with emotionally durable design the industry does not have to have a compulsive need to keep on producing more and more products at increasing speeds, but it can concentrate on making better products that can

²⁰⁴ Walker 2006, 41.

²⁰⁵ Chapman 2015, 21.

²⁰⁶ Chapman 2015, 25.

carry other services to help in maintaining the products. According to Fletcher and Grose, the true measures of durable garments are those that relate to the meaning of the garment carries, which is shaped by how it is used by its wearer²⁰⁷.

There are some negative sides to durable design, which many researchers claim can contribute to unsustainability and why the attitude towards durable products should be careful. Chapman says that when durability is seen only as a physical endurance there is a risk that other important factors that contribute to durability are forgotten in the design process. Chapman also poses a question whether durable design in those instances is actually a form of designing durable waste.²⁰⁸ Mathilda Tham writes that especially in the fashion industry durability is a widely used strategy which is used in claiming that the products are sustainable even though many items are used for a very short while and discarded before the physical endurance of clothing has desecrated²⁰⁹. This habit of discarding products before their useful life is over is the result of two things. First of all, it has to do with the changes in fashion. Secondly, it is due to the fact that clothing has not been able to foster any real bonds with its user. Ultimately it comes to what it actually means to design durable products. While physical endurance is important some could argue that even more important is to design products that do not get thrown away before their useful life is over. Other point of view to the dangers of durable product design is presented by Walker. According to him, product longevity can be a contributing factor in creating more problems by decreasing employment opportunities to those people who work within production and also prolonging the unsustainability of the whole system.²¹⁰

The most notable characteristics of durable design have to do with creating emotions and allowing products to age alongside with their users. Chapman discusses some of these emotionally durable characteristics in detail in *Emotionally Durable Design*. He claims that the value of durable products was found within six experiential themes which are narrative, surface, detachment, attachment, fiction and consciousness.²¹¹ While these themes may explain why some products are more durable than others, the most

²⁰⁷ Fletcher & Grose 2012, 85.

²⁰⁸ Chapman 2015, 12-13.

²⁰⁹ Tham 2012, 217.

²¹⁰ Walker 2006, 74.

²¹¹ Chapman 2015, 174-175.

important thing for a designer is to know how to include aspects of them in the actual products. One way of making sure that people keep clothing longer is when textiles and garments are designed to adapt to longer wear and improve with age²¹². When designers pay more effort to ways products behave in use, consumers are more likely to perceive changes in the product's appearance in a positive way. In fashion, a good example of durable products and ways it was designed to improve with age is a leather jacket, which will through use and aging create a certain patina to its look that can be perceived as an increased value. Therefore according to Fletcher and Grose, the key point in creating durable garments is to be able to understand the various aspects of durability whether that is emotional, trend-based or physical and the context where the garment will be worn²¹³.

²¹² Chapman 2015, 119.

²¹³ Fletcher & Grose 2012, 86.

4. Designing sustainable fashion

4.1. Sustainable design strategies and waste management

Sustainable design has meant finding out new ways of designing and producing products without so many environmental and ethical issues. It has been about lessening the impacts and creating new systems that are better equipped to handle the purpose of sustainable development. Usually the most common way of industry has been about minimising the effects of designs and production. McDonough and Braungart speak of a new vocabulary which uses terms such as reduce, avoid, minimize, sustain, limit and halt. These terms refer to the approach of finding out a less objectionable approach than what we currently have in use.²¹⁴ While these approaches are definitely a way forward, there are still even better ways of designing that begin from the point of view that we need to change the whole system, not just the defects of the current one. This is because it is becoming clearer and clearer that things cannot continue the way they have been going for much longer. Sustainable design strategies are methods by which designers can incorporate sustainable design into use²¹⁵. They are strategies that give designers guidelines to help reduce the environmental impact and also question the common practices in the design field. According to Lawson, there is a certain need to question conventional design processes²¹⁶ and one way of doing so is integrating sustainable design strategies into designer's own design practice²¹⁷.

While sustainable design strategies give designer's tools by which to increase sustainability of their work, one should note that the strategies themselves are not perfect by any means. Chapman defines sustainable systems as possessing "the ability to be maintained indefinitely" and adds that no one strategy aligns perfectly within this description²¹⁸. There is always some loss of energy happening in the cycle whether it is in the production, use or the at end-of-life of the product. However, some designers view the excess energy as a positive addition to the quality of the product. According to Timo Rissanen, especially physical and visual durability can be the result from an increased

²¹⁴ McDonough & Braungart 2002, 46.

²¹⁵ Gwilt 2011, 69.

²¹⁶ Lawson 2006 in Gwilt 2011, 59.

²¹⁷ Gwilt 2011, 69.

²¹⁸ Chapman 2015, 168.

amount of materials in the product or from extra investment of time and energy put to its production²¹⁹. Ultimately, it is up to the designer to choose and have an effect on the amount of resources that are put into a product.

There have been many approaches to sustainable design over the last 50 years, some with better chances for success than others²²⁰. According to Rebecca Earley, the Textiles Environment Design Project differentiated ten different strategies that are perhaps most widely acknowledged in the design field today. These are: design to minimize waste, design for recycling/upcycling, design to reduce chemical impacts, design to reduce energy and water use, design that explores clean and better technologies, design that looks at models from nature and history, design for ethical production, design to replace the need to consume, design to dematerialize and develop systems and services and design activism.²²¹ While some of these strategies may carry different names in other sources, essentially they have the same meaning each with their own point of view. Chapman specifies strategies that are focused on specific stages of product life cycle which are often referred to as 'Design for X' (Dfx) strategies including strategies such as design for disassembly, recycling and reuse²²². Although Chapman does not include design for waste minimisation or prevention into his definition, they can be seen as belonging to Dfx-strategies, since they also have an effect on product's life cycle. At least in common design practice these Dfx strategies are the most known and widely practiced strategies. According to Sass Brown, recycling, redesigning and reuse are especially practiced in innovative design approaches, where the aim is to give used textiles new life and added value²²³.

Generally sustainable design strategies have been considered as solutions to the problems of waste management in design industries. According to Rissanen, the principal motivation for using fabric waste arises from environmental concerns²²⁴. In terms of sustainability we should make the most out of products even at the disposal stage in order to get as much energy and resources back as possible. There are also economic

²¹⁹ Rissanen 2011, 135.

²²⁰ Chapman 2015, 8.

²²¹ Earley 2012, 87.

²²² Chapman 2015, 8.

²²³ Brown 2013, 14.

²²⁴ Rissanen 2013, 11.

reasons behind using waste management strategies. According to Cooklin, the most significant sources of garment cost are fabric and labour, with fabric making approximately 50 percent of the cost²²⁵. So actually waste management strategies have a significant effect of the cost of a product. Common waste management strategies are reduce, reuse and recycle otherwise known as the 3R and their aim is to "extract the maximum benefits" from a product and extend its life cycle²²⁶. These strategies are a part of a larger model that compares the benefits of different strategies and it is called 'Waste management hierarchy'. The model is presented by Timo Rissanen in *Zero-waste Fashion Design: a study at the intersection of cloth, fashion design and pattern cutting*.²²⁷ (See Figure 8.) Rissanen has based the model on the theory of White, Franke and Hindle (1999). According to the figure, the most favoured option is waste prevention and the least favoured option is waste disposal. While the figure does not include the amount of how much each strategy is used in fashion industry, most likely the methods that are employed today still consist of the disfavoured strategies such as waste disposal, incineration and energy recovery.

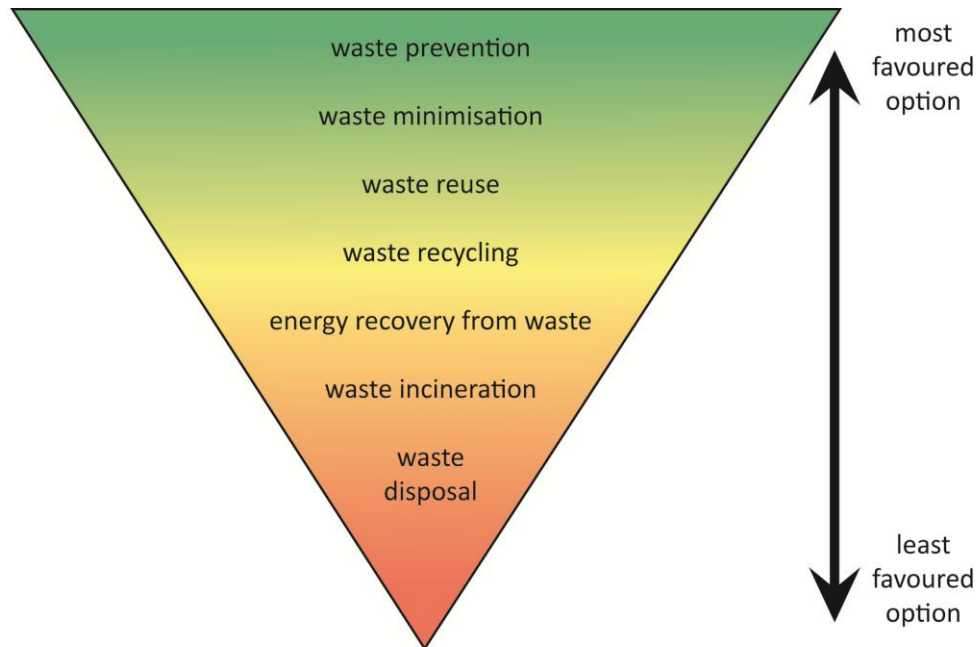


Figure 8. Waste management hierarchy adapted from White, Franke & Hindle (1999). In Rissanen (2013).

²²⁵ Cooklin 1997, 9 in Rissanen 2013, 3.

²²⁶ Fletcher 2008, 99.

²²⁷ Rissanen 2013, 6.

Dfx strategies place into the middle and a bit above the middle in the figure of waste management hierarchy. This would indicate that they are not the most preferred strategies when it comes to sustainable design. Fletcher and Grose discuss the effects of waste management strategies in *Fashion & Sustainability*. According to them "the least resource-intensive option is reuse, since it generally involves collection and resale of garments 'as is'." Reconditioning or design for disassembly is more intensive in terms of resources and the most resource-intensive in recycling.²²⁸ Kirsi Niinimäki points out that reuse and recycling demand no change in the current way of consuming, which is why they can be taken easily into practice. She also adds that essentially recycling means that used products are recycled into new materials, which can mean either downcycling or upcycling.²²⁹ Depending on whether the materials of the earlier products are usable without much modification the quality of the new products might be even greater than before given that the design of the new product is stronger. Most of the time, however, using materials as they are is quite difficult, which is why they need to be processed into new fabrics which usually results in lower quality.

When deciding which strategies to use, one needs to acknowledge that on average even the least favoured Dfx strategies are doing something better than doing nothing at all. However, John Ehrenfeld underlines that recycling, reconditioning and reuse do not have that great of an impact that would actually save the planet²³⁰. Fletcher and Grose also emphasize that while Dfx strategies may require some resources they are nothing compared to the costs of manufacturing with virgin materials²³¹. Timo Rissanen claims that the most effective way is to eliminate waste already in the design process, which means that designer has to know the production and construction processes of garments²³².

In the centre focus of the waste management strategies are waste materials which have a significant impact on the processes and on the end-products. According to Brown, waste is multiplied in all the stages of production "from the growing, extraction or

²²⁸ Fletcher & Grose 2012, 63.

²²⁹ Niinimäki 2013, 18.

²³⁰ Ehrenfeld 2015, 59.

²³¹ Fletcher & Grose 2012, 63.

²³² Rissanen 2013, 19.

manufacturing of the fibre to the cleaning, spinning, dyeing, finishing, weaving, knitting, cutting and sewing of the garments"²³³. So there are notable differences between different kinds of sources of waste. Cassidy and Han write that the two fundamental sources of waste are post-consumer waste and pre-consumer waste. Pre-consumer waste in fashion industry consists of fabric cut-offs and end-of-roll fabrics in the manufacturing stage and in retail from unsold and damaged items.²³⁴ Thilak Vadicherla and D. Saravanan make a distinction between pre-consumer waste and post-industrial waste and they point out that the latter is generated during manufacturing process. Post-consumer waste then consists of clothing and textiles that are essentially ready for disposal and landfill.²³⁵ Cassidy and Han also note that post-consumer waste may include items provided by different charity shops and organizations.²³⁶ One should also note that the term 'second-hand' refers to used items that are sold to new owners²³⁷.

Nevertheless, there are risks involving the use of sustainable design strategies. While they offer a method or a structure for the designer that engages in sustainable design principles, the outcome is not necessarily always viable. The designer must take into consideration the whole process and the supply chain in order to create something truly sustainable. The other problem has to do with choosing the correct strategies for the correct design tasks. According to Chapman, most of the used methods today such as reduce, reuse and recycle do not go to the source of the problems²³⁸. Also Fletcher agrees that the problem within those strategies lies in the fact that they fail in optimizing the whole system. She also adds that recycling is ultimately just a transition strategy which in a transforming society can be the advocate for change on social level making people more aware of sustainability in design fields.²³⁹ So in conclusion, the Dfx strategies merely attend to the causes of previous systems without significantly changing it. With the question of waste management strategies, while reducing the amount of waste, they are

²³³ Brown 2013, 129.

²³⁴ Cassidy & Han 2013, 150.

²³⁵ Vadicherla & Saravanan 2014, 142-143.

²³⁶ Cassidy & Han 2013, 151.

²³⁷ Gordon & Hill 2015, chapter one.

²³⁸ Chapman 2015, 164.

²³⁹ Fletcher 2008, 107.

essentially decreasing the quality of the materials. This process is better known as downcycling²⁴⁰.

4.2. Zero waste

As a solution for waste management strategies there have been many approaches that try to eliminate some amounts of fabric waste and give them a new purpose in the forms of new designs. Much of the problems in today's fashion industry such as the creation of waste could be avoided if design and production stages were more integrated²⁴¹. This shift towards more integrated design and production would also increase possibilities for designers to practice more sustainable design in fashion industry. Then designers would have the opportunity to see all the problem areas of production and create designs that would save resources and increase the efficiency of production. It would also mean that waste could be minimized more effectively. According to Holly McQuillan, zero waste fashion design is a step toward a new model of design and production that embraces uncertainty, holds great regard for materials and the impacts of production to the environment²⁴². As a waste management strategy it is the most favoured option, since its main goal is waste prevention.

There is a clear material focus in zero waste strategy. Zero waste begins from a different point of view, where there is no creation of waste due to the way it is eliminated already in the production of the garment. Currently zero waste is widely accepted and practiced strategy in industrial design where most of the materials can be quite easily used and melted again to decrease the waste percentage of the production. In the textile and fashion industry, deploying zero waste is not quite as simple, since the waste material cannot be rearranged after its initial use. Originally zero waste was created in the attempt to use all the fabrics in the production due to their expensive nature, but recently the focus has shifted in to a strategy, the main goal of which is not to create any waste.²⁴³ Although fabric and textiles in the fashion industry have cheapened they are still considered as being worth saving, especially in sustainable design. One important aspect

²⁴⁰ Fletcher 2008, 100.

²⁴¹ McQuillan 2011, 85.

²⁴² McQuillan 2011, 87.

²⁴³ Aakko & Niinimäki 2013, 70.

of this is also the fact that all textiles whether they are more expensive or not are used without creation of textile waste as they should be. After all, especially when textiles are made from virgin material, the environmental impacts alone are a reason enough not to waste any more materials in the production stage. By using zero waste, designers can limit the effects of production to their minimum and increase the sustainability of their designs.

While waste elimination is the centre focus of zero waste it can be viewed also as a philosophy that essentially involves designers into thinking about the durability, functionality and aesthetics of the garments. Timo Rissanen writes that the zero waste practice requires both technical and aesthetic consideration with much understanding about conveying two dimensional patterns into three dimensional garments²⁴⁴. There is no point in denying the fact that materials have an increased influence on zero waste designs, but they are no way the only criteria in the design process. Rissanen also mentions that designers have to balance the concern of waste with the appearance, fit and cost in the zero waste design²⁴⁵. In order for zero waste to be a viable option in fashion industry we need to be able to see the benefits of it in terms of quality and the cost of the products. The zero waste philosophy does not end at production line but continues throughout the product's life cycle. According to Timo Rissanen, a broader definition of zero waste takes into consideration how the life of a garment could be prolonged before it is disposed²⁴⁶.

There have also been some concerns about zero waste posing too many limitations for design practice. Some claim that zero waste practice is too binding and limits the possible outcomes to fewer options. It is true that in order for zero waste designs to be successful, the designer has to have a good deal of knowledge about the approaches and how to conceive them in new ways time and time again. Rissanen argues that the zero waste approach itself does not pose any limitations to creativity given that the designer is aware of how the approach works.²⁴⁷ It is important to consider waste as an opportunity rather

²⁴⁴ Rissanen 2013, 63.

²⁴⁵ Rissanen 2013, 79.

²⁴⁶ Rissanen 2013, 14.

²⁴⁷ Rissanen 2013, 156.

than as a problem. In zero-waste approaches innovative uses of waste material can create infinite possibilities in terms of design.

Fashion creation practices can be divided into different approaches in terms of how they use zero waste strategies. Timo Rissanen discusses these approaches in *Zero-waste Fashion Design*. According to Rissanen, fabric waste creation is an integral point of reference in three different kind of methods of fashion creation, which are: Fully-fashioned, Cut & Sew and A-POC²⁴⁸. These three methods are presented in Figure 9²⁴⁹.

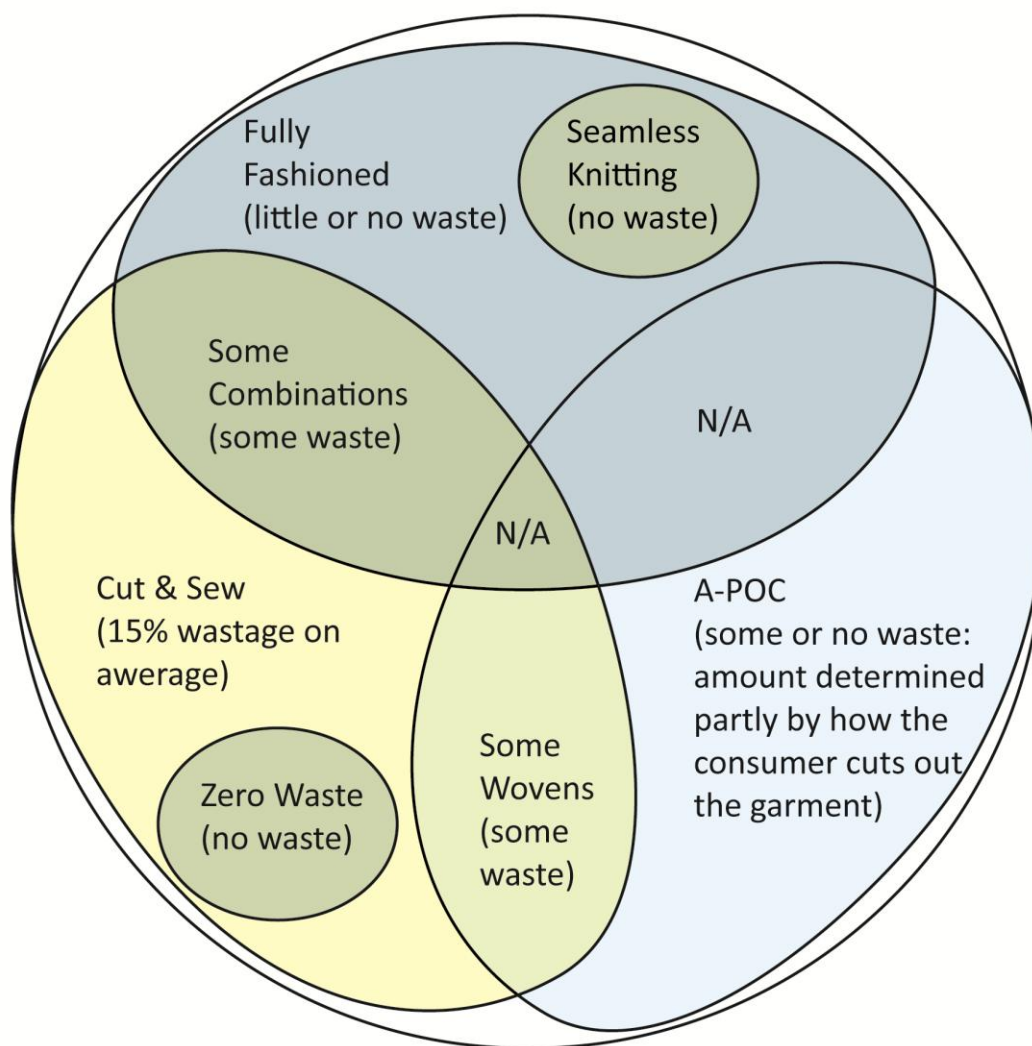


Figure 9. Fashion creation methods from fabric waste creation perspective according to Rissanen (2013)

²⁴⁸ Rissanen 2013, 28.

²⁴⁹ Rissanen 2013, 29.

According to Black, Fully-fashioned is commonly used in knitwear, where the different pattern pieces are individually knitted and then sewn together in order to form the finished garment²⁵⁰. Traditionally in knitwear there is no creation of waste at least in the knitting and sewing stage, since creating different shapes is quite straightforward. According to Kim, Fiore and Kim A-POC is made using an industrial knitting machine that essentially creates a continuous tube of knit, which is cut into garments by the consumer following to indentations on the knitted tube²⁵¹. Cut & Sew then is the most used method in fashion industry where pattern pieces are cut from fabric and then joined together. This method does not place any restrictions to the fabrics that can be used.²⁵² Zero waste is closely related to Cut & Sew method, where on average there is a 15% wastage that is created during the manufacturing process. In the zero waste approach this amount of waste is further reduced to zero.

Patternmaking is a significant feature of zero waste, since without successful patterning and use of textiles the waste is not minimized in the production. According to Rissanen this involves the assumption that patternmaking is viewed as an integral part of design process and not a step following it²⁵³. Rissanen also emphasizes the awareness of patterns throughout the whole design process which will prevent designers from using excessive amounts of fabric in the attempt to create durable products²⁵⁴. While some people view zero waste as a method that may lead to excessive use of material, in real terms this should not be the issue. Often times extra fabric can be used as a durable component that makes it possible for the user to modify the garment or repair it if something should happen to it. Extra fabric can also be used in the way that makes the garment more durable in places where there is going to be more stress to the fabric which would normally lead to tearing.

Essentially there are two ways in which designer can create patterns within zero waste strategy. The first of which is traditional patternmaking. One of the most important aspects of patternmaking is shape awareness, where according to Rissanen the designer

²⁵⁰ Black 2002, 178 in Rissanen 2013, 29-30.

²⁵¹ Kim, Fiore & Kim 2011, 134.

²⁵² Rissanen 2013, 34.

²⁵³ Rissanen 2008, 203.

²⁵⁴ Rissanen 2011, 128.

has to know how two dimensional negative shapes that are the creation of basic pattern pieces could be used in the finished product²⁵⁵. These negative shapes refer to the areas that usually cannot be used in garment production, making them textile waste. In order for the designer to use these shapes, there has to be a sense of what works where in the garment and how can those shapes create something more than aesthetic impact on the garment. Rissanen also points out that "Maintaining an awareness of the two-dimensional patterns on fabric while simultaneously sketching a three-dimensional garment is a formidable challenge" which in the design process can prove to be quite difficult²⁵⁶. Lynda Grose also emphasize the skills and imagination involved in zero waste patternmaking and compare it to the efficiency of industrial jigsaw and CAD systems²⁵⁷. The second way of creating zero waste patterns is by draping. Grose speaks of designer's method of "thinking by hand" that is very easily visualized in the draping process²⁵⁸. In the process, a designer approaches zero waste from a draping perspective where the focus is on creating a three-dimensional shape which is later transformed into pattern pieces.

In zero waste, there are different approaches that can be used in creating designs without waste. Most easily recognized and visualized approaches are perhaps tessellation and jigsaw methods, which according to Holly McQuillan are special pattern-cutting techniques where all the pattern pieces interlock with each other²⁵⁹. The theory behind this method is in creating patterns that use up the entire width of the fabric²⁶⁰. Holly McQuillan uses one pattern in her tessellation pattern which exemplifies the way pattern pieces interlock on the fabric. (See Figure 10.) According to her, tessellation makes it possible to repeat the same pattern over and over again and to produce almost an infinite number of possible designs using the same pattern.²⁶¹ While the jigsaw puzzle approach does provide designers a relatively easy way of creating zero waste patterns, it can also create some problems in terms of aesthetics and function of the clothing. McQuillan points out that especially overuse of fabric and drape are possible disadvantages in some designs. As a solution designers should introduce a traditional pattern pieces into zero

²⁵⁵ Rissanen 2013, 95.

²⁵⁶ Rissanen 2013, 90.

²⁵⁷ Grose 2013, 56.

²⁵⁸ Grose 2013, 54.

²⁵⁹ McQuillan 2011, 89.

²⁶⁰ Rissanen 2008, 185.

²⁶¹ McQuillan 2011, 87.

waste approach and use them as guidelines during the patternmaking process enabling "more fitted or defined individual garment forms".²⁶² Other approaches of zero waste design make it also possible to use multiple textiles in same designs. One example of this is called multiple cloth approach which according to McQuillan provides more flexibility into the cutting of pattern pieces²⁶³.

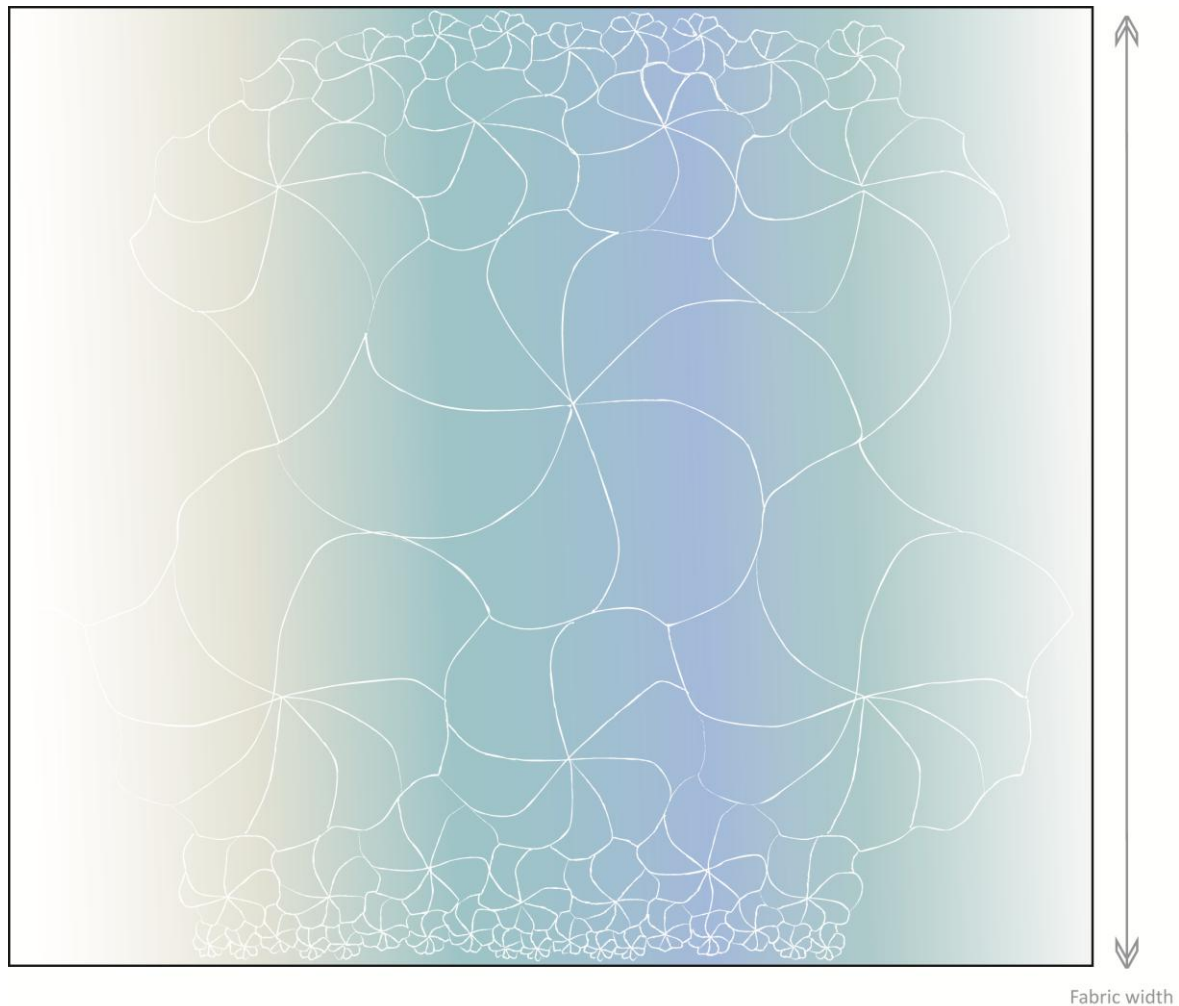


Figure 10. Tessellation pattern developed by McQuillan, redrawn by the author

As established before, zero waste is "a design technique that eliminates textile waste at the design stage"²⁶⁴. Timo Rissanen writes in the article *The Fashion System Through a Lens of Zero-Waste Fashion Design* that while zero waste is definitely a step forward towards more sustainable use of materials, it does not necessarily mean that the designs are sustainable. Rissanen underlines that we need to examine zero-waste in the context of fashion and sustainability, since the context itself is what determines whether the

²⁶² McQuillan 2011, 93.

²⁶³ McQuillan 2011, 95.

²⁶⁴ <http://www.ecochicdesignaward.com/learn-glossary/>

design is actually doing something positive for the environment and people.²⁶⁵ Other criticisms of zero waste have also been made. Maarit Aakko and Kirsi Niinimäki claim that the strategy does not fit completely with the models that are used in the fashion industry and so zero waste is best suited to experimentation and unique fashion designs that are produced by small studios²⁶⁶. Also Rissanen acknowledges the fact that there are certain limitations in zero waste that slow down especially the production in the design and patternmaking stages. According to him zero waste does not fit into "conventional fashion industry hierarchies" where especially grading and marker making are difficult to include into the patterns at the design stage.²⁶⁷

Although zero waste prevents production from creating waste in the design and cutting stages, it does not mean that waste is eliminated completely from the entire product's life cycle. In terms of sustainability it is better to ask how zero waste affects the overall quality of garments. Although many designers consider zero waste as a strategy that is specially employed only in the design stage it should be considered as a force that has an effect on the whole life cycle of the product. From the industry's point of view, zero waste, if employed correctly, would have a transformative effect on the whole supply chain, having an influence on the materials and chemicals as well as on the products and the way they are used²⁶⁸. Zero waste can also be viewed as having a positive effect on the fashion system by slowly slowing it down²⁶⁹. So in a way zero waste is not just a strategy that is usable in the design stage. It should be considered as a strategy that has far reaching effects that reach all the way to the end of product's life cycle. To get to this stage zero waste requires holistic dedication on parts of designer and the consumer, for it to be completely successful. Fletcher speaks of zero waste vision, where all of these components are working together. Overall it requires "a reformulation of design priorities based around ideas of cycles where waste is reconceived as a useful, essential and valuable component of another product's life".²⁷⁰

²⁶⁵ Rissanen 2015, 208.

²⁶⁶ Aakko & Niinimäki 2013, 75.

²⁶⁷ Rissanen 2015, 205.

²⁶⁸ Fletcher 2008, 108.

²⁶⁹ McQuillan 2011, 96.

²⁷⁰ Fletcher 2008, 113.

4.3. Upcycling

In waste management strategies, recycling is located in the middle of the waste management hierarchy most likely because it essentially decreases the quality of materials. (See Figure 8.) This process is also known as downcycling, which essentially means that scrap products and materials are being transformed into materials and products of a lesser quality and reduced functionality²⁷¹. According to Vadicherla and Saravanan, downcycling and upcycling are essentially solutions which prevent overconsumption, pollution and the creation of waste²⁷². By using excess material that would otherwise be wasted during production or after a user has disposed of a product, downcycling and upcycling give materials new purposes in the form of another product. However, in sustainable design there is a concern that by using strategies such as recycling and downcycling potential value and lost materials are enabling pollution and unsustainable practices to continue²⁷³. That is why there is a visible shift to using strategies that aim to change the system or at least to overcome to better quality than it was originally.

Upcycling can be seen as a counter act against downcycling. By its definition upcycling means recycling materials by increasing the quality and potential value of the materials²⁷⁴. According to Reet Aus, the term was first used by Reiner Pilz in 1994. Pilz used the term in an interview where it essentially stood for better environmental values in the waste management practices.²⁷⁵ Before that recycling had been the major approach to waste management and the major concern had to do with losing the potential of waste materials. Upcycling was supposed to be a solution which could transform waste into higher quality items and materials. Cassidy and Han discuss upcycling in their article *Upcycling Fashion for Mass Production*. According to them upcycling uses less energy than recycling and it is not dependent on virgin materials.²⁷⁶ In fact, Cassidy and Han see upcycling as a new way of thinking and working where instead of waste we can see valuable resources that can be used in imaginative ways for making

²⁷¹ Vadicherla & Saravanan 2014, 140.

²⁷² Vadicherla & Saravanan 2014, 140.

²⁷³ McDonough & Braungart 2002, 57.

²⁷⁴ Niinimäki 2013, 18.

²⁷⁵ Aus 2011, 43.

²⁷⁶ Cassidy & Han 2013, 153.

new products²⁷⁷. It should come as no surprise that in the textile and fashion industry we have enough materials to go around for quite a while without even having to resort to using virgin materials. In order for designers to see the possibilities of waste, there needs to be a change in thought process, where one product's end becomes another's chance of life. In a way upcycling is very closely related to cradle-to-cradle thinking. Furthermore, if we consider the definition of sustainable design in terms of upcycling, there is a certain connection between the two. While the Brundtland report speaks of saving energy and providing future generations same kind of possibilities of happiness²⁷⁸, also upcycling aims to change the way waste resources could be used for creating better products.

In upcycling, waste materials have a significant effect on the process of designing and how the finished garment is going to look. Joan Farrer writes about the possibilities of upcycling as a sustainable design strategy in the article *Remediation: Discussing Fashion Textiles Sustainability*. According to her, in the process of upcycling evaluating the quality and potential of waste materials is essential, since the goal is to create something with more value and higher quality.²⁷⁹ It does not matter how high quality the waste material is if the material is not suited for the design or if the manufacturing and production processes damage the integrity of the material. Designers should ask themselves whether the designs are visually pleasing and functional in their context of use to make sure that the end result is truly sustainable and in fact upcycled. Cassidy and Han emphasize that upcycling is gained through "clever design and skilled craftsmanship" which is truly transformative²⁸⁰. From the perspective of sustainable design upcycling is currently the most favoured practice, since according to Gordon and Hill it "eliminates the need for newly manufactured goods-and functions as a distinctive alternative to mass-produced fashions"²⁸¹.

Waste material has a great impact on the upcycling method, since it is generally the first thing designers look at when they start their design process. Reet Aus exemplifies the system of textile waste strategies in *Trash/to Trend: Using Upcycling in Fashion Design*²⁸².

²⁷⁷ Cassidy & Han 2013, 154.

²⁷⁸ Report of the World Commission on Environment and Development: Our Common Future 1987.

²⁷⁹ Farrer 2011, 35.

²⁸⁰ Cassidy & Han 2013, 153.

²⁸¹ Gordon & Hill 2015, chapter one.

²⁸² Aus 2011, 42.

(See Figure 11.) Aus examines upcycling as a term the main purpose of which is to bring waste back into the production of fashion industry²⁸³. In the figure Aus makes distinctions between upcycling, recycling and reuse. The first two are mainly the practices that are used by the industry whereas reuse only happens to post-consumer waste and in the product level it means that there are no modifications or energy used to transform the material.

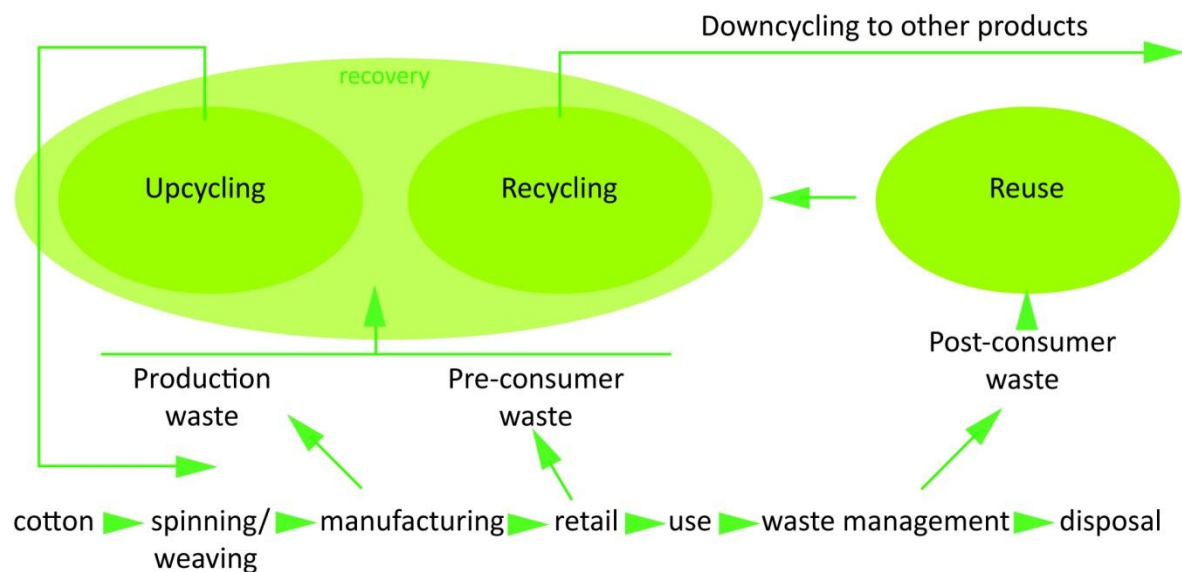


Figure 11. Textile waste strategies according to Aus (2011), redrawn by the author

During the recovery process, design has the main power to transform waste materials into upcycled products. The materials which are usable in the upcycling process come from production waste, pre-consumer waste and from post-consumer waste. Those waste materials are then downcycled to other products or upcycled back into the production depending of the textile waste strategy employed by the industry. According to Aus, upcycling is the main solution for resolving the problems of textile waste, since it gives the waste a new value that is respected thorough the design stage²⁸⁴.

Upcycling has other characteristics that are working for it in sustainability terms. According to Aus upcycling is " one of the easiest methods to be deployed within fashion

²⁸³ Aus 2011, 41.

²⁸⁴ Aus 2011, 42.

design because the main input comes from the designer"²⁸⁵. In this way a sustainably concerned designer may have a greater effect on the designs and production, thus decreasing the negative environmental footprint of the products and increasing sustainable practices. Aus also points out that upcycling as a concept respects local production²⁸⁶. This is mainly possible, because much of the materials can be found locally in upcycling industries. Gordon and Hill also add that there is a certain emphasis on individuality, where upcycled garments have a one-of-a-kind nature.²⁸⁷

²⁸⁵ Aus 2011, 42.

²⁸⁶ Aus 2011, 43.

²⁸⁷ Gordon & Hill 2015, chapter one.

5. Analysis

In this chapter I will go into more detail regarding the methods and process of analysis. The frame of the thesis deals with design qualities that should coincide within sustainable design. These qualities are function and aesthetics. I will be conducting the analysis stage of the research based on two methods that will evaluate function and aesthetics in design. (See Figure 12.) The methods include Papanek's function matrix and Delong's aesthetic analysis. For the analysis I have selected six different cases of garments designed either using zero waste or upcycling strategies. After the analysis I will compare the results of the analysis to the background theory and attempt to answer the research questions based on the evidence that was found in the examples.

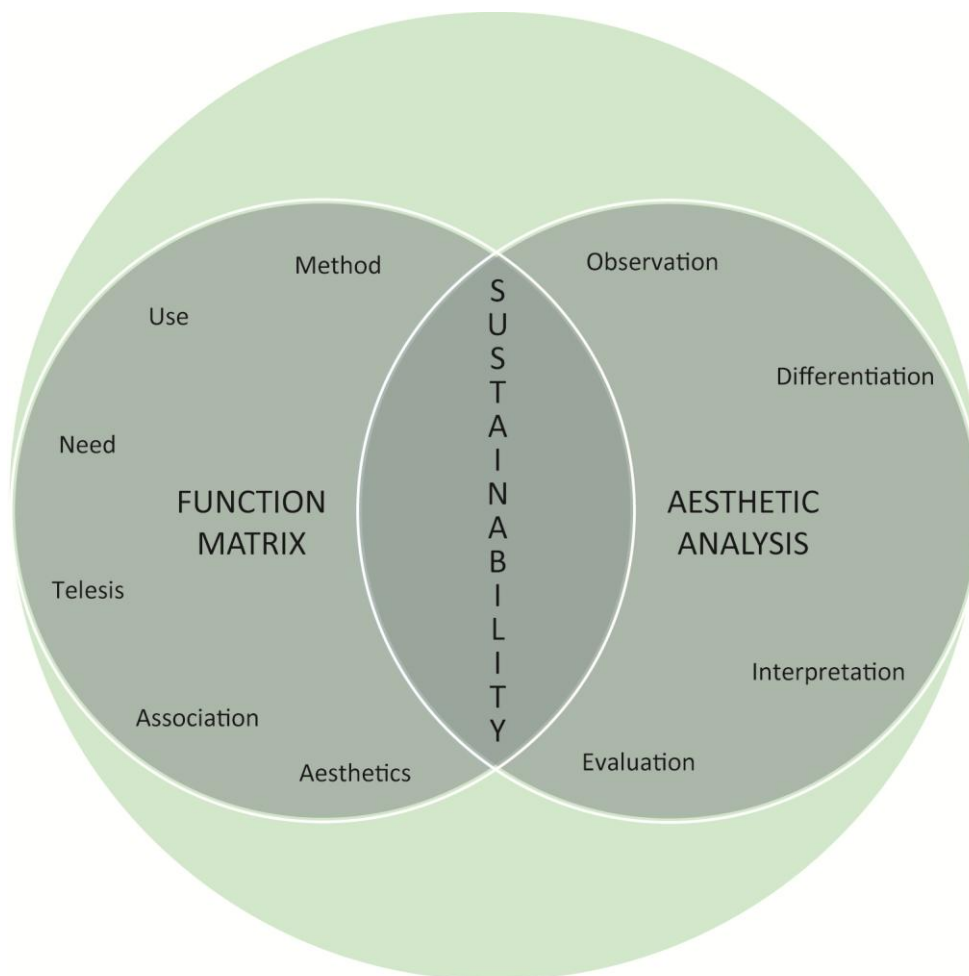


Figure 12. Expanded frame of research

5.1. Design function and aesthetics

'Function' or 'functional' according to the Oxford English Dictionary are "a special activity or purpose of a—thing" that is both practical and useful²⁸⁸. According to this definition function is closely related to the performance of a product that makes it possible to use that particular product for a specific thing or purpose. Victor Papanek explores function in the context of sustainability and design in *The Green Imperative* and *Design for the Real World*. According to him, if a product functions well it is also an indicator of beauty²⁸⁹. Beauty then can be seen as a synonym for human desire for order²⁹⁰. Mads Folkmann sees aesthetics as being integrated into design discourse essentially affecting the function of communication in design²⁹¹. So in a way function is closely related to the aesthetic side of designing, since it clearly has an effect on the visual impact of a product that is manifested through function and the way a product performs. Papanek also adds that there is certain evidence that aesthetics or beauty and high utility relate to each other in well-designed products²⁹². Therefore, in the design field it is important to consider the effects of both design elements and examine the way they relate to sustainability.

Design as we have established before is a process²⁹³ that involves the designer to know how to create functional and aesthetically pleasing products. In this process one may ask which one of the elements comes first or is more crucial to the design process. There is a well-known saying in the design field, which states that "form follows function". Thus according to Barnard, the first thing designers should consider is the function with form or aesthetics following it.²⁹⁴ However, Barnard also adds that function itself "cannot appear without taking some form"²⁹⁵. So in traditional sense function is first and foremost the element that distinguishes design objects from non-design based objects. Victor Papanek views design as being "conscious and intuitive effort to impose meaningful order"²⁹⁶. This meaningfulness is the key to success, since according to Papanek it has the

²⁸⁸ Oxford English Dictionary 2010.

²⁸⁹ Papanek 1995, 49.

²⁹⁰ Horn 1975, 265.

²⁹¹ Folkmann 2013, 25-27.

²⁹² Papanek 1995, 57.

²⁹³ Folkmann 2013, introduction.

²⁹⁴ Barnard 2014, 46.

²⁹⁵ Barnard 2014, 49.

²⁹⁶ Papanek 1997, 4.

power to replace expressions such as "beautiful", "ugly", "cute" and "disgusting"²⁹⁷. The term also refers to the fact that there is some sort of a conscious pattern which is used in the design process that has far reaching effects in terms of what is considered good functional design. While form is often considered just a manifestation of functional qualities, it too has significant effects on the actual quality of design. Marilyn Horn uses terms such as "more meaningful", "more effective" and "more beautiful" when describing and judging the value of design²⁹⁸. It is clear that not only function but also aesthetics and form have the power to change our perceptions of design products. Furthermore, aesthetics has a significant part to play in our attempt to achieve sustainability in design field. According to Fletcher, aesthetic sensibilities act as "a great social attractor, an outlet for ideas, a form of cross-referencing and an agent of change"²⁹⁹. McDonough and Braungart also point out that aesthetics have a way of affecting our needs which are modified by ecological and cultural circumstances³⁰⁰. So without a question the element of aesthetics has the potential to have even greater of an impact to achieving sustainability than the function in the sense that aesthetics' visual message can be very effective in creating change to our ways of consuming.

Function as well has an effect on the sustainability of design where well-designed products are more likely to stand the test of time and be more efficient and practical in their intended context of use. Jonathan Chapman and Nick Gant discuss function in terms of design in *Designers, Visionaries and Other Stories*. According to them, function can be viewed through a linear scale where on the one end we have task-oriented function and on the other end we have sociological function. Task-oriented function includes the objects that perform and fulfil certain practices in user context. Sociological functions then have a way of "mediating the particular values and beliefs of the user".³⁰¹ Sustainability can be created through either task-oriented function or through sociological function. Depending on the product and the way it is used either task-oriented or sociological function is being applied. There is no doubt that without function there is no way a product can be sustainable if we limit ourselves into the design field. Chapman and

²⁹⁷ Papanek 1997, 6.

²⁹⁸ Horn 1975, 264.

²⁹⁹ Fletcher 2008, 126.

³⁰⁰ McDonough & Braungart 2002, 141.

³⁰¹ Chapman & Gant 2007, 142.

Gant point out that function also gives many opportunities to embed the idea of sustainability into design practice³⁰². A well-designed product is more likely to stay in use longer and they are also more likely to get fixed if there is some sort of problems occurring due to prolonged use.

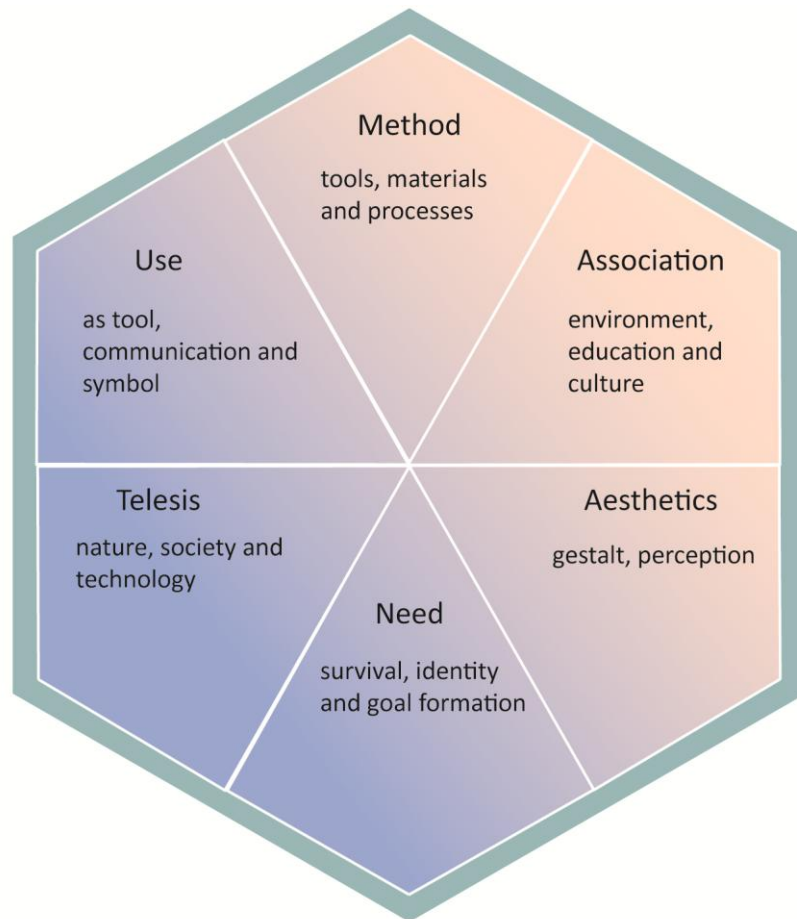


Figure 13. Function matrix according to Papanek (1997), redrawn and modified by the author

Victor Papanek introduces his six sided function matrix in *Design for the Real World: Human Ecology and Social Change*³⁰³ (See Figure 13.) Papanek's original idea for the six sided function matrix derives from Horatio Greenough who introduced the famous and well known phrase "*form follows function*"³⁰⁴. In this the main principle is to let the function lead the designing process so that the final product and its aesthetic components would be directly influenced by functionality. However, it is important to notice that

³⁰² Chapman & Gant 2007, 141.

³⁰³ Papanek 1997, 3-27.

³⁰⁴ Greenough 1739 in Papanek 1997.

while the matrix seems to examine and divide function in terms of design it also has elements that are close to the aesthetics of design. According to Papanek, this aesthetic side is crucial in order to reach a form that both functions well and is aesthetically pleasing.³⁰⁵

The six sided function matrix consists of method, association, aesthetics, need, telesis and use. According to Papanek method includes the interaction of tools, processes and materials. Here all three sub-units should be used in a way that comes most naturally to them.³⁰⁶ For example, materials should look like what they are originally and all the tools and processes should be used in the most efficient way to create the finished product. Use can be easily made into a question form: Does the design/product/form work in its context of use? Therefore, one can examine use through the way a product can be used as a tool, communication aid or as a symbol. Here it is crucial to ask if the design is really needed and whether it satisfies a primitive need or is just a product of desire that people do not actually need. Papanek lists different types of needs such as economic, psychological, spiritual, social, technological and intellectual need which are more difficult to satisfy than those that are manipulated by fads and fashions.³⁰⁷ Hence in short, the need has to do with survival, identity and goal formation, where a certain product should satisfy some kind of a need for any of those categories. According to Papanek, telesis in the function matrix is about using processes of society and nature in order to obtain certain goal. Papanek suggests that telesis is achieved when a design is current and it reflects the state and conditions of society. We also cannot take things out of their context and expect them to function properly without any consequences.³⁰⁸ When examining the association we need to take into consideration early environment or in other words upbringing, culture and education that forms our values of life³⁰⁹. Where does the design belong to, what kind of associations does it have and what kind of effect does the designer have on these associations? Then lastly function matrix contains aesthetics. Papanek considers aesthetics as a tool that shapes the form of a design

³⁰⁵ Papanek 1997, 6-7.

³⁰⁶ Papanek 1997, 8.

³⁰⁷ Papanek 1997, 15.

³⁰⁸ Papanek 1997, 17.

³⁰⁹ Papanek 1997, 19-21.

product. This form may evoke different kinds of emotions that essentially give meaning to the design.³¹⁰

Thus in fashion and clothing, function and aesthetics are the primary elements that decide whether a garment is well-designed. In addition to these two, there is a third element of design, which according to Janice Ellinwood, is structural design. However one should note that also structural design has an effect on the quality of the finished product, although it is not so visible in most designs. According to Janet Hethorn, aesthetics is usually understood as referring to the visual elements of clothing that form the total look. Function on the other hand has to do with performance and needs. Hethorn and Ulasewicz also point out that only when both aesthetics and function are fulfilled in the design can the fashion sustain people and create well-being.³¹¹ Many people associate aesthetics with fashion and function with clothing. In actuality this divide is not as simple as aesthetics and function have effects on both fashion and clothing.

As discussed earlier, functions of fashion and clothing are slightly different³¹². According to Barnard, fashion has social, cultural, economic and aesthetic functions³¹³, when clothing on the other hand bares functions that have to do with performance and safety. The main thing is to notice that functionality in clothing and fashion increase the versatility and enhance user experiences in different contexts³¹⁴. Therefore, functional garments are easy to use in different contexts, they are practical and yet visually pleasing. To design clothing that not only fulfils basic functions of clothing as well as functions of fashion takes time and effort, but it is also what will make the designs sustain in the long run.

Aesthetics in fashion and clothing can be seen through a combination of different elements which, according to Marilyn Horn, are balance, proportion, rhythm, emphasis and the unity of design³¹⁵. Horn also mentions that aesthetic values of a dress are closely related to the time and place of when the clothing was designed, which is why when

³¹⁰ Papanek 1997, 21-22.

³¹¹ Hethorn 2008, 58.

³¹² Barnard 2014, 42.

³¹³ Barnard 2014, 32.

³¹⁴ Horn 1975, 317.

³¹⁵ Horn 1975, 270.

making any judgments we have to consider that in order to make any accurate assumptions³¹⁶. In terms of sustainability, aesthetics should not be dismissed, since it affects the way we look and judge clothing. Fletcher mentions in *Sustainable Fashion and Textiles* that the aesthetic side of designing sustainable clothing is very important since it acts as "a great social attractor, an outlet for ideas, a form of cross-referencing and an agent of change".³¹⁷

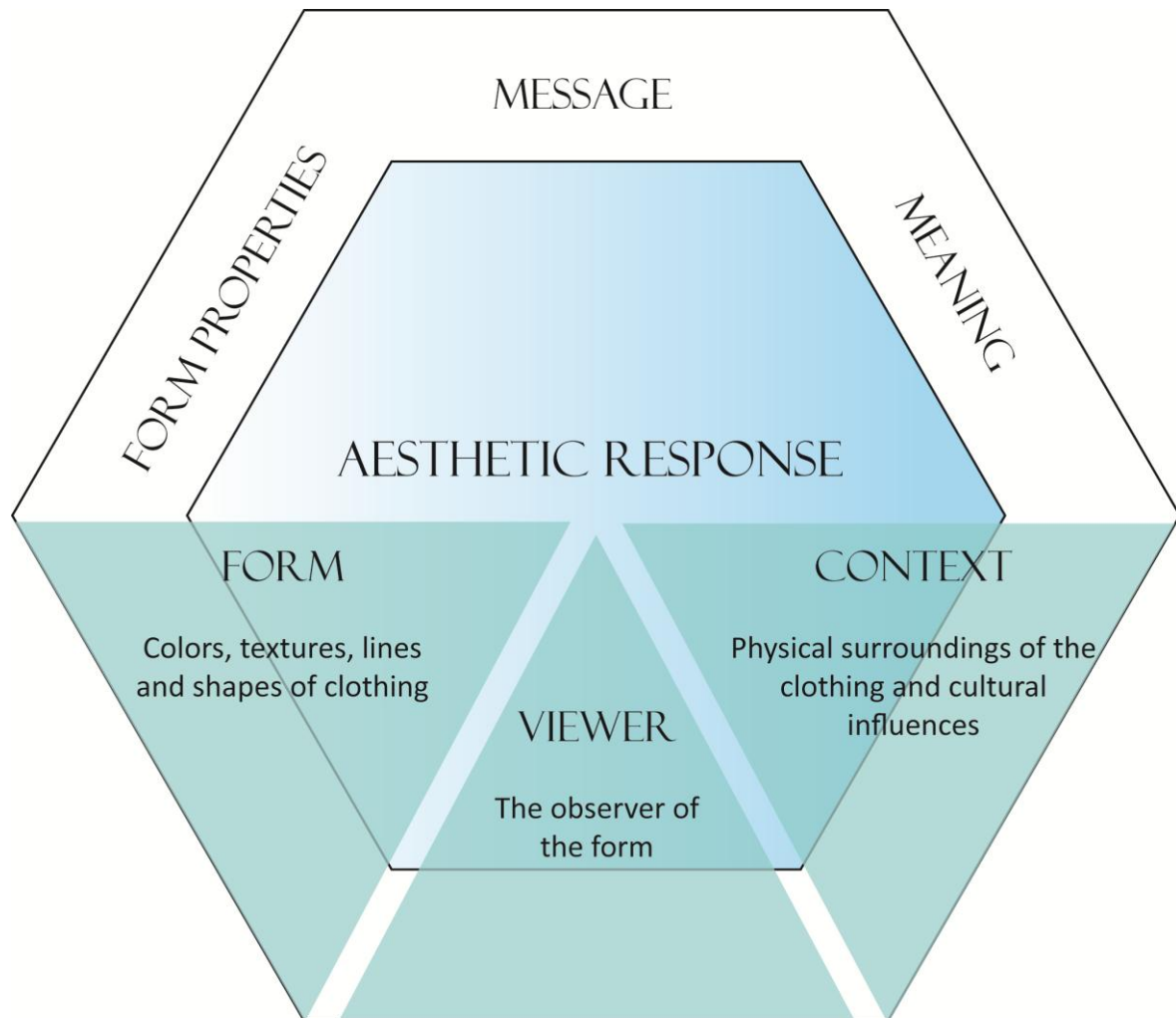


Figure 14. Aesthetic Response according to Delong (1998), redrawn by the author

In *The Way We Look* Marilyn Delong introduces a method of distinguishing aesthetic perception in fashion and clothing. However, before moving onto the perception method it is important to understand how the aesthetic response forms in theory and what are the constituents. According to Delong, the aesthetic response is based on three elements

³¹⁶ Horn 1975, 281.

³¹⁷ Fletcher 2008, 126.

that are form, viewer and context.³¹⁸ (See Figure 14.) A form has to do with the look that consists of colours, textures, lines and shapes³¹⁹. Therefore the look of the garment is based on the whole form that includes all the visual elements in the garment. DeLong also adds that even though each feature may be viewed separately the complete visual perception is based on the combination of features and their relationship in the form³²⁰. The second element that forms aesthetic response is the viewer who essentially is the observer of the form³²¹. Depending on the viewer aesthetic response may differ greatly due to the subjective nature of the viewer. Some might deem garments more aesthetically pleasing than others only due to their own opinions and the way they observe the world. The last element of aesthetic response is then context. According to DeLong, context means the immediate physical surroundings in which the garment is observed and the cultural background that has an impact on the way we see things.³²² If we, for example, take a piece of clothing out of its context we will interpret it very differently than in the original context. For example a bathing suit is a completely normal thing to wear at beach in summer but if we were to see someone in a bathing suit during winter we would certainly wonder what is going on.

A full perceptual awareness according to DeLong can be divided into four stages that are observation, differentiation, interpretation and evaluation. (See Figure 15.) According to DeLong, the objective of this methodology is to be able to "analyze the form of the apparel-body-construct and its relationships to the viewer and the contexts".³²³ Observation is carried out by paying attention to the total visual form and describing what is visually there. The next step is differentiation which requires "identification of the visual parts and then an awareness of their relationships". DeLong adds that it is essential to find out the patterns in which different features of the form influence others and the complete look. The third stage is then the interpretation that "consists of looking for the themes and associations of meaning that seem to summarize and explain the form". The final stage is evaluation that is about making final conclusions and judgments. In the

³¹⁸ DeLong 1998, 9-11.

³¹⁹ DeLong 1998, 13.

³²⁰ DeLong 1998, 28.

³²¹ DeLong 1998, 16.

³²² DeLong 1998, 18.

³²³ DeLong 1998, 54.

evaluation process, the viewer should be able to detach oneself from the process and make an honest evaluation of the perception that is not based on subjective criteria alone.³²⁴ In conclusion, a full perception according to DeLong means "understanding the communication between the audience and the product" and what the form properties, message and meaning of a garment are³²⁵.

Step 1 Observation	Consider the entire form. Describe what you see and identify any information you can glean about the form - for example, the ordering in which you see visual parts 1, 2, 3, etc.
Step 2 Differentiation	What are the parts? What makes the parts appear separated? Are the parts equal? Is one part dominant? What are their relationships? Are they similar in color, texture, shape? How do the parts combine? Why did you see the order of parts in Step 1? What is the visual result? What degree of simplicity/complexity?
Step 3 Interpretation	What are the visual themes? How is the form characterized - that is, what is its character and quality, who wears the form, how it is worn, etc.? Then, how is it summarized What is the relation to intention/function: suitability for purpose? How is the intention communicated? With what clarity?
Step 4 Evaluation	How does the apparel-body-construct relate to the individual, visual culture, fashion, time period, place, location? How is appearance defined according to culture's values? How does the apparel-body-construct fit within the culture and time period? Describe relation to personal and cultural ideals. How is the apparel-body-construct excellent? Unique? What about it gives you pleasure and satisfaction?

Figure 15. Steps to Aesthetic Analysis of the Apparel-Body-Construct according to DeLong 1998

5.2. Analysis of the cases

For the analysis I have chosen six photos of garments that have either been designed using zero waste or upcycling as a design strategy. Three of the garments are designed using zero waste as the main strategy and the other three using upcycling. However, one should note that in some of the cases distinguishing one strategy from another is not as straight forward, since upcycling and zero waste can be used together in the design process. The materials of the garment may have been upcycled, but the strategy that has been employed in the design process may still be different. That being the case, I have tried to limit the examples to the garments that were visibly one or the other for the

³²⁴ DeLong 1998, 56.

³²⁵ DeLong 1998, 54.

purpose of this thesis. All of the examples are designed by different designers or labels in order to give a more extensive view of the strategies. In this manner, I also attempted to limit the effects of designers' personal effects in the aesthetics, since all the designs have their own point of view. Most of the examples are also from smaller unique brands that showcase individual designers' talents better. The upcycled examples are designed by Reet Aus, Amandah Andersson and Orsola De Castro. For zero waste I picked designs from Titania Inglis, Bolor Amgalan and Ada Zanditon.

I have chosen the example designs based on their design details and what I deemed the most interesting in terms of analysis. Obviously my own design aesthetics have influenced the choosing process, since I wanted to pick examples that I had a positive visual response to. I also paid attention to the selection in terms of how they use design strategies. The goal was to choose examples where the two strategies were used in different ways to offer a better perspective on how the strategies may influence the function and aesthetics at design level. That being said, I also paid attention to the process of making such garments and the materials to some extent, since, for example, in zero waste examples I did not want to use just knitwear that in design respects is much easier to produce than using Cut & Sew. Therefore in the analysis I will only use one example of knitwear and the strategy applied in the example is upcycling. In conclusion, the examples of the analysis offer different point of views in terms of how they use sustainable design strategies.

5.2.1. Case 1. Zero waste dress by Titania Inglis

Aesthetic analysis

Observation

The look is a loosely fitting over the knee length sleeveless dress with pockets. The dress has a slightly higher boat neck collar. The silhouette of the dress is a slight A-line. The armhole has a slight curve to it. The dress is made from white cotton and from dark grey leather. The majority of the dress is made from the leather that has a slight sheen to it. In the front piece of the leather there are some larger and smaller splotches of staining that are coloured slightly brown. The leather is used in the front of the dress



Case 1. Zero waste dress by Titania Inglis (2014)

and the whole hem of the garment is made from it. The white cotton, on the other hand, is used on the collar and as the top part of the dress. There is a visible seam in the front. Where the cotton and the leather meet there is a strong shape consisting of two diagonal lines and the highest point of these lines is in the front of the dress. The lines also seem to lower down towards the back of the dress where the proportion of white seems to increase considerably. In the hem there is no seaming details as the leather does not fray.

Differentiation

The different parts of the dress are formed by the use of different materials. In total there are two parts to the dress with the leather part being the more dominant one at least at first glance. One could argue that the stains of the dress would make for one additional part, even though visually it makes more sense to include them into the leather part. The different parts of the dress are coloured differently. They also have different texture and shape to them. Proportionally the leather part is at least three times as large as the white cotton part. The texture and the colour of the leather changes depending on how the light hits it and where the stains are placed. The cotton part, however, seems to have a more monotone colour and texture. The relationship between the two parts is contrasting. The white colour is so different from the darker grey which visually makes their relationship appear interesting. The shape of the cut in the front also has an effect on the visual result. It enhances the visual power of the leather part and, on the other hand, defines the shape at the top of the form.

The order of the parts in which I see them is the leather and then the white part. Although I originally said that the leather is the dominant part, there is also a certain visual effect on the white part that may cause the viewer to associate it as the dominant part. As for me, I am visually more drawn into the leather due to its interesting pattern which is why I see it before the other part of the form. As a form the visual result of the dress is simple yet effective. Even though the form is simple, there are certain amount of details that make the form interesting.

Interpretation

The form of the dress is worn confidentially since it has such a strong visual impact. It also seems like the dress is made out of high quality materials that increase the value of the

design. As a look it can translate into anything from casual to more evening given that its user has the confidence to wear such a piece. Because of the classic silhouette, the dress is likely to stay in fashion for long.

The visual themes of the form have to do the juxtaposition of what is clean and what is stained. The visual impact of the garment is strong. While the clean white part reminds new and pristine items, it also creates an impactful contrast when considering the leather and its stains. It is almost like the white has bled all the way to the hem as a manifest of its power against the dark leather. In sustainable design this can be seen as symbolizing the use of new materials and the effects they have on the environment. As a design strategy, zero waste has been mainly employed to the use of white cotton which on the other hand emphasizes the value of the material. In terms of the leather and its stains the way the material has been used highlights also the beauty of desecrated materials. The leather has a visual impact that is created by the stains. They seem to contain information about the material, where it came from and how it affects the viewer emotionally. All in all, from a design's point of view the dress succeeds in having a lasting effect on the viewer that also speaks for sustainability efforts.

Evaluation

The apparel-body-construct relates to the individual as well as to society in general. Individualism is created in the form through the stains which are unique to each piece in the production. These stains almost give a permission to wear the garment more roughly just to see the effects it has on the material. Leather is also one of those materials that actually has the potential to increase its value through extensive use where the patina can be considered as a visual cue that reveals something from its user. The apparel-body-construct relates also to the society through the values it showcases through its design elements. Here the stains and overall desecration of materials is used in the way that is rarely seen. While still showcasing simplicity, the mistakes become the highlight of the garment that not only speaks about the way we as a society are treating precious materials but also changes our way of perceiving the future of fashion industry. These design details also speak of the culture and time period we are currently in. Having something worn or stained is not just about being indifferent about one's looks. It can

also mean that the garment has a history that should be worn as a patch of honor for the environmentalism.

Function matrix

Method

The materials used in the look have not been treated in the way that would make them appear unnatural. The white cotton looks like what it is and in the shape it works very well due to its stiffness and the way it holds its shape. The leather, on the other hand, is a heavier material that drapes well which is why it is used in the hem. In the dress the leather is not too thick which makes it more comfortable to wear. As for the treatment of the stains, there has been some sort of processes that have been used in order to make them look like they are. These processes involve using some chemicals that may be harmful to the environment. Of course in all leather production there are always some types of processes going on that involve the use of chemicals in the tanning process. However, as a look the stains message that even small imperfections in the leather can be used for our advantage and it can actually be the design detail that makes an outfit special.

The processes used in the dress involve the idea of zero waste. The shape of the white cotton reveals that zero waste has been employed in the patternmaking. However, in the leather there is some amount of wastage coming from the process due to the desire to keep the silhouette and shapes of the dress as simple as possible. In terms of processes, this means that the outfit is easier to produce. Also there are no extra seaming details that would decrease the production time.

Use

As a dressier garment, the outfit works in its context of use. The silhouette is quite forgiving for different body types and the structure and the materials seem durable and well constructed. The garment can also be worn during almost any time of the year. Also as a fashion piece, the dress has such a strong message that will make it stand out from other designs. The silhouette has classical features and when they are compared with modern use of materials and design details the design is going to stay on fashion for long.

Need

As a piece of clothing, the dress satisfies the needs for subsistence and protection. The need for subsistence can be satisfied by having concrete things and with clothing that is almost always achieved. As a material product, the garment also provides protection. Especially leather can be considered as a material that is both durable as well as resilient that protects its user. The shape can be seen also as a contributing factor to the protection as it is quite modest and loose in its silhouette. But then again the dress is quite short which in terms of protection may lose some of its effectiveness. As a fashion item, the dress has the potential to satisfy the needs for identity, participation, understanding and even affection. Since the dress carries such a strong message of finding beauty in stained things, it may have an effect on the emotions of its user. This message may also provide some understanding about what it means to be sustainable in fashion industry.

Telesis

As I have discussed earlier, the design of the dress is current in the sense that it reflects the way we are discarding materials in fashion industry. The message of the dress showcases that there are different kind of definitions as to what one can consider beautiful. Therefore, aesthetics is not a linear line that can be defined by using just pristine materials. From nature's perspective, the use of worn and old things is preferred since they can be transformed into new things that will continue the circle of nature.

If we, however, consider the processes involved in making the garment, the actual result can be interpret in different ways. On the one hand using zero waste eliminates the wastage from the production of the garment which in sustainability's point of view is a good thing. On the other hand, if we concentrate on the processes that have been used in the making of the materials look as they are, the overall effects of those processes are potentially harmful. There is also the concern of having to distress materials just to prove a point. In the end the designer is responsible in making the decision about which processes are needed in order to produce a garment that from designs perspective speaks for the cause and carries a strong message.

Association

The associations of the dress relate to sustainability and our consumption culture in general. It speaks for delivering a different kind of aesthetics where it is possible to see beauty in old, distressed or even broken things. These marks of life in materials and products we use carry meaning and history that bring more value to the products and help their users to identify themselves with tangible objects. Using zero waste also speaks for valuing the materials we use in the fashion industry. The energy used in the production is transferred directly to the products which increases their quality.

5.2.2. Case 2. Zero waste outfit by Bolor Amgalan

Aesthetic analysis

Observation

The outfit consists of a top, a skirt, a handbag and a headpiece. The top is a loose but short shirt that reveals the models midriff. The shirt has 3/4 length sleeves. The material used for the shirt looks like transparent organza that has a blue tint to it. One can see the transparency in the sleeves and in the back of the shirt where also the seaming details are visible. However, the front of the shirt is not transparent. The material has a slight sheen to it. The hem of the shirt looks wavy. In the front there seems to be a slightly lighter blue printed details that consist of horizontal and vertical lines that crisscross. The light reflects differently from the print making it look shiny. The width of the lines in the print is approximately one centimetre. The shirt does not have a collar but from the back it seems like the neckline rises much higher than from the front.

The skirt, on the other hand, is high waisted a-line in terms of its silhouette. From the photo it is impossible to tell, but the length of the skirt is below the knee. There are three different materials used in the skirt. The most visually striking is the blue coloured boxed shaped material that could be some sort of a cotton that holds its shape very well. The material of these boxes appears quite matte in the photo. Since the shapes of the boxes are three dimensional, they remind of origami. The boxes are attached to the skirt from their flaps. The box shaped details start from the waist and they fall downwards in a neat vertical line formation all the way to the hem of the skirt. In the photo there are in total six rows of these details each consisting of five to six separate boxes. In between the



Case 2. Zero waste outfit by Bolor Amgalan (2015)

boxes there are spaces where different type of material is being used. This material looks more like the organza and it is coloured in two different tones of light blue.

The handbag is completely made out of blue boxed shaped pieces that are all attached together. The shape of the bag is square and in total there are six lines of box details in each side of the bag. Each line consists of at least four pieces of box shapes. In comparison with the skirt the box shapes are slightly smaller. The headpiece is made out of clear and transparent plastic. As a shape it reminds of a visor that covers only parts of the forehead. The headpiece has a pattern of vertical and horizontal lines with circles.

Differentiation

I differentiate five different parts of the outfit. These parts are the headpiece, the top, the print detail in the top, the box shapes in the skirt and in the bag and the other material used in between the box details in the skirt. Visually it makes more sense to count the details of boxes as only a one part of the dress. The parts appear separated due to the materials, shapes and textures they have. For example. the shirt and the print appear different due to the coloration and the texture. Also the box details differentiate from the other material used in the skirt due to their shape, colour and texture. As for the headpiece, the materials and shapes in there make it also stand out from the rest of the outfit.

In the outfit there are no clearly dominant parts that would stand out more than the others. However, visually the most interesting and complex part is the box details which do stand out slightly from the rest of the parts. The relationship between the parts is mainly constructed via the repetition of certain shapes and the use a textures. There are a lot of vertical and horizontal lines in the outfit that bring in cohesion between the parts in the form. For example, the print and the headpiece have similarities in terms of shapes of lines and the shine. Also the box details tie in with the print where it seems that the concrete shape of the box is transformed into to a more abstract form in the print. There are also similarities in terms of materials. For example, the shirt and the skirt material that is between the box details have a similar feel to them. All in all, even though the parts at first glance appear very different, there is a certain relationship between them that also defines the cohesion in the outfit.

In terms of visual result, the outfit is quite complex that is partly created by all the different parts in the form. The different textures, shapes and materials add to the complexity of the look. However since the outfit has a similar colour story it helps in tying the look together.

Interpretation

The visual themes that can be found in the garment have to do with added functions and ways to interpret things. The overall form has many geometric lines, that when put together, create almost like a netting effect. One could look at it like everything in the form is connected through these lines. The top is quite airy and as a form it creates the sense of lightness to the look. The head piece, rather than providing protection like a true visor or a hat, highlights the face almost like a halo. The print is also reflective and it draws attention to itself. It is also as if the headpiece and the top are showcasing the body inside much more than the bottom of the outfit. They are also showing through the structure of the pieces. This also counteracts the potential heaviness of the bottom. The skirt and the handbag, on the other hand, are much more concrete forms than the top and the headpiece. The box details build upon the body creating almost a new dimension. The boxes have a resemblance to the origami but they are translated to a textile form. This can be seen as an interpretation of the qualities of using materials sparingly and not making any waste at the process.

As an aesthetic form, the look is quite complex which adds to its playfulness. While the complexity can create difficulties in terms of use, the innovativeness and possibilities far surpass the possible flaws of the outfit. In addition, the quality of the outfit in terms of design details is well executed which adds to the overall impression of the look.

Evaluation

The apparel-body-construct affects the individual viewer of the form through the innovative use of materials and structures that challenge the perception of clothing. The structure of the form is both imaginative and personal which can give its user new ways of identifying and interacting with the clothing. As a form, the outfit also has potential to challenge the viewer intellectually. In the fashion industry there is always room for new innovations, especially if the innovation has the potential to change our consumption

habits. Since the outfit has been designed using zero waste as a design strategy, the form is of this moment where society is getting more and more concerned about processes that are harmful for the environment. According to culture's values, the form can be even too extreme for most people but from design's point of view there are many positives to the design that can certainly inspire and create new possibilities in terms of design techniques and aesthetics.

Function matrix

Method

The materials used in the outfit look like the materials that they truly are. The processes are more complex since there has been clear efforts of how to implement zero waste design strategy into them. The most complex process has probably been figuring out the technique of producing the box material where the shape is three dimensional. As a finished product, the process of attaching such pieces together takes also more time and energy than traditional methods. However, one has to also consider the benefits of using such processes and how they affect the finished look. The idea behind the material innovation has been about providing options and giving the user a chance to change the order and placement of the details. The material can also be easily repurposed for another products when the garment has reached the end of its life.

So all in all we have to consider the overall effects of processes and what is necessary in order to create a sustainable garment. It might be that some of the processes might be more labour-intensive but the sustainability and innovativeness far bypasses the weaknesses of those processes.

Use

The context of use of the outfit is difficult to determine since the pieces are less functional and more directed towards innovative use of new techniques and materials. As clothing, the individual pieces do not fit to every occasion or even for any user. The three dimensional details of the skirt might be too difficult to wear when sitting and they require a very certain body-shape. Also the top might be too sheer and too short. One could argue that the context of use is built upon the fashion element, where the pieces have more of a communicational value than anything else.

Need

The subsistence in the outfit has to do with material things and as pieces of clothing and accessories the look satisfies that need. The protection can be viewed from different point of views. One could argue that the sheer layers and fabrics do not provide much protection in terms of covering the body. On the other hand the box details provide additional space that can be considered as satisfying the need for protection. So ultimately it is dependent on the user whether or not the garment fulfils the need for protection. As fashion garments, the look also has the potential to satisfy needs for identity and participation. These needs correspond with the qualities that showcase the user's personality and will to be a part of the group that is early adopters. Besides these needs, the outfit can also satisfy the need for creation, since there are components that can be detached and rearranged into new formations.

Telesis

The processes used in the garment correspond with the processes of nature for the most parts. The philosophy behind zero waste and being able to reuse the materials for another projects speaks for sustainability and prolonged use of garments. It also takes into consideration the user's requirements in the sense that they can have an effect on the aesthetics of the look by using the box details in different ways. If we consider nature, there are many unique and quite complicated things going on which also can be seen reflected in the garments.

Association

As a form, the look reminds me of what it was like to be a child and play with different toys. In a way I see these toys reflected in the garment that I associate with possibilities and imagination. The value of being able to imagine things is crucial in our culture where we need more choices in terms of how we can do things better. The design and innovation play a significant part in achieving better future, which is reflected in the garment in a positive manner.

5.2.3. Case 3. Zero waste dress and harness by Ada Zanditon

Aesthetic analysis

Observation

The look consists of a long draped evening dress and a decorative harness. The dress is a sleeveless black tulle dress that has a high neckline. The dress is draped and one can see the layers of sheer tulle fabric very easily. In the waist the dress is more fitted and towards the hem it pillows out. The armhole is shaped like a sharp v. The harness is made out of leather that has been cut into ornate shapes that have been twisted in order to create a three dimensional structure. Some of the shapes look like leaves and some of them are just twisted strips of leather. The leather has been coloured golden from one side and black from the other. The golden side of the leather has a shine to it while the black side is matte. On the side of the harness one can see a black leather strap that has five black rounded studs. Studding has also been used in the decorated part as a method of attaching leather pieces. The decoration covers most of the front of the dress from the waist up. There are also some decorations showing on the back.

Differentiation

There are two parts in the form, the first one being the dress and the second one being the harness. The different parts seem separated due to the colours, textures and shapes. The dress is darker coloured compared to the harness and as material the tulle has much more lightness compared to leather. The textures are also very different. The tulle has a very soft look to it, whereas the leather is more rigid and shiny. Also as an effect, the way the leather has been treated differentiates it from the dress. As a shape the harness has more complexity than the rest of the form.

Although the harness has more complexity as a form, the different parts are equal. The relationship between the two parts is harmonious. While the different textures and complexity of the shapes varies greatly, there are also similarities between the two parts. For example, the colour of the tulle is very close to the darker side of the leather. There are also spaces in the harness where one can see the dress behind which is why the two parts seem to be connected. As a visual image, the first thing that I see in the form is the harness due to its contrasting colours and ornate shapes. The dress, on the other hand, is



Case 3. Zero waste dress and harness by Ada Zanditon (2015)

very simple that balances the potential heaviness of the top. So in terms of the visual result the form is both complex and simple.

Interpretation

In terms of function and suitability the form fits to its context that is eveningwear. The visual themes found in the form have to do with classical definitions of beauty and historical references. The dress seems almost like a traditional and historical draped dress that many historians and designers associate with ancient Greece. The ease and sheerness of it also bear resemblance to many other dresses that have been portrayed thorough the history of fashion. The two parts of the form remind of Corinthian order where the ornately shaped leaves reach towards to sky. While having references to both of these things the form does not conform only to traditional means of achieving them. For example, the use of leather is very unexpected which creates more interest and also ties it in with the time and fashion of today.

Evaluation

The apparel-body-construct relates to the individual through the visual themes and their contradictions. While at first glance the form may seem like it has been seen before, through closer examination the use of materials and techniques make the form more unique. These details increase the aesthetic durability and extend its uniqueness beyond just being a classic. This level of uniqueness may also influence the user to feel more attached to the clothing.

On some level the appearance of the outfit is defined by social values that have an influence over what things we consider beautiful. As a fashion item, the outfit does not contradict our aesthetic preferences but rather conforms to them. Presenting no challenge in terms of aesthetics may increase the initial attraction towards a product. However, from the sustainability's point of view, this may decrease the effectiveness of sustainability in the future.

Function matrix

Method

There are two main materials that have been used in the outfit. The first of which is tulle, which as a material has been portrayed in the way that comes naturally to it. One can see the transparency of the material in the drape and the overall lightness of it that is adding the sense of effortlessness to the form. The processes involved in making the tulle dress have been quite simple, since there is not that much detail to the garment. The second material is leather that has been processed more heavily in order to make it look the way it is. First of all, the leather has been coloured in order to achieve the look. Secondly, there have been processes involved in cutting and twisting the structure in the harness that has even further transformed the material. Whether the methods involved in the harness have decreased the actual quality, is difficult to determine but, obviously, they have a certain effect on the aesthetics of the look that has been the main motivation behind the production processes.

Use

The design is a form of eveningwear and as such both of the pieces fit into that context either separately or together. As a form, the dress is effortless and it fits to many occasions and also potentially for many users. The harness, on the other hand, is more of a statement piece that is more of a decoration in terms of its purpose. Therefore, it has to be worn with something in order to fit into its context of use.

Need

The outfit as clothing satisfies needs for substance and protection. As a fashion item, it also has the potential to satisfy at least the need for identity. One could argue that the need for subsistence can be achieved by having just a material items, which in this case are clothing. The need for protection is then satisfied by wearing clothing that either covers body or provides warmth. Since the outfit is clearly eveningwear, there is not much protection involved in the context of use, but even then it essentially covers parts of the body and provides protection that way. If we think of the function of harnesses, usually their purpose has been to protect their users by covering the most essential parts of the body. In this case the harness can be thought of as a metaphor that mentally may convey an image that is also about protection whether in reality it might not perform so

well. The important thing to notice that there are many ways to fulfil certain needs that may be dependent on the way their users perceive the world and not all needs are manifestations of the tangible world. On the contrary, some of them are more in tune with emotions.

Telesis

In terms of design processes, telesis is achieved in the design. The focus of zero waste is to not create any waste and in the outfit it has been achieved by draping and complicated detail-oriented processes. Especially using leather in a more sustainable way is not easy, since the material itself does not have a certain universal shape. By using complicated and small scaled shapes in the harness, the designer has been able to use even the smallest pieces of material that would otherwise be considered as waste. If we consider the processes of nature, this kind of sustainable use of resources is self-evident, which is why one could argue that the design does achieve telesis.

Association

The design has many kind of associations that in terms of sustainability relate to the processes of generating less waste while still focusing on achieving aesthetically pleasing outcomes. The inspiration behind the outfit is also clearly visible that also speaks for continuity of classical definitions of beauty that still have pairing even in today's fashion. While the design may present itself as nothing new or ground-breaking, the success lies in the technical advances that could be considered innovative. These techniques also speak for values of the materials and the art of handcrafts.

5.2.4. Case 4. Upcycled dress by Reet Aus

Aesthetic analysis

Observation

The garment is a dress made from denim material. As a silhouette, the garment is slightly loose A-line shaped dress. The dress has a high V-neck and short sleeves that have been turned once. The dress also has pockets on the side. Lengthwise dress is over the knee. The dress is made out of wide strips of denim material, with at least two different



Case 4. Upcycled dress by Reet Aus (2011)

coloured denim. The lighter coloured denim acts as an accent in the middle of the dress as well as in the sleeves. All the strips of fabric are placed diagonally making a rising chevron pattern to the front of the dress. In the bodice there are six strips of fabric in V-shape with the addition of one from the sleeves. The lowest point of the chevron is in the middle of the dress. The strips of fabric have been top stitched together in order to form the fabric for the dress. All of the visible seams of the dress are left raw. The hem is fraying a little. In the turned up sleeves one can see a stitch line made with dark-coloured yarn against the lighter coloured denim. The hues of denim vary in the dress and one can see previous hints of where the seams have been.

Differentiation

The parts of the dress are all of the diagonal strips of fabric with the addition of sleeves. One could even count more parts in the dress if one considers one chevron shape of consisting from two strips of fabric. Then in total there would be approximately fifteen parts, but visually I only see four parts since I consider sleeves counting as one, the middle lighter coloured piece as one and the darker coloured denim pieces as two. The parts appear separated due to the seams in the chevron pattern. All the parts of the dress are not equal, since the lighter coloured strips in the middle of the dress and in the sleeves make then pop out from the darker strips of denim fabric. In addition, the colour and the turned sleeves also are contrasting elements in the dress. The parts of the dress are not similar in shape but they compromise of similar shaped pieces of denim with the exception of sleeves. The texture of the dress is also similar and the only contrasting aspects are the colours of denim. The parts seem to be in very close relation with each other due to their shape and placement. Visually the parts also combine seamlessly to each other forming a complete look.

The first thing that I saw in the dress was the centre light coloured strip of denim, since it is in front and centre in a contrasting colour. After that my eyes focused on the shape of the neckline and the remaining darker strips of denim. I think that the order in which I saw the parts of the dress was influenced by the large scale pattern of the dress. It was also visually the most interesting detail in the dress. The overall look appears quite simple and straightforward but effective in terms of its aesthetics. In conclusion, the visual result of the elements of the dress is successful and cohesive.

Interpretation

The form of the dress is harmonious and yet playful. The pattern is very well executed and it accomplishes in its simplicity to have a strong visual effect on the viewer. The dress looks like a casual wear that could be worn on many occasions. There is a certain playful quality to the dress that is not so serious. What could be seen as a element of decreasing value is the details of finishes, even though they are executed quite cleanly. Due to the finishings the structure of the dress seems kind of bare. Also material has quite a large effect on the visual result of the garment, since denim is usually associated with leisurewear. In this case denim contains certain patina that might cheapen the result if not done correctly, but in this garment I do not see that having that much of an effect on the quality of the finished product. Rather I see the patina making the dress more unique. The model wears the dress quite casually and it looks quite comfortable to wear. She has her hands in the pockets which emphasizes the looseness of the fit.

In terms of intention the pattern of the denim strips has most say in the form. The chevron V-shape repeats many times and it is even manifested in the neckline. Also the shape of the sleeves seem to conform to the same shape. The only exception is the hem, which is cut straight. The function of the dress suits the form that is also more relaxed and casual.

Evaluation

The apparel-body-construct relates to the themes in upcycling that have to do with creating new life to worn textiles and increasing their quality in the process. In terms of technique, the form of the dress is very functional and the materials can easily be used to create upcycled fashion. The worn textiles, in this case denim, has an individual quality that not only showcases the history of the fabric but also looks ahead to the future. I can imagine that if the dress is in the use for long the denim will start to fade even more especially in the places of stress and seams. This will give the dress even more of an individual quality to which the user can relate to. From fashion's perspective, the dress is still very current and will remain so due to the fact that the style lines are so classic and the dress so easy to wear. One can also see who designed the dress as Reet Aus uses a similar pattern, silhouette and materials in many of her other of her pieces.

The dress bares similar values as the culture in general. Everything meaningless has been omitted and only the bare essential is visually there. It is almost like the pattern of the dress points to the ground or to the landfill from where the materials have been saved from. The design has given a new purpose for these materials which can also be seen visually in the garment. In terms of the pattern and materials, the dress also has a unique quality where each piece is different and special, even if it is produced in larger quantities. The uniqueness and individuality also speak for sustainable design in the respects of making garments that evoke emotions in its user. From a design's point of view, the dress succeeds in communicating a strong message in favour of sustainability without resulting into banal methods of shouting. It is more about hinting that there is an agenda behind the dress that is giving new life to textiles and creating wellbeing at the same time.

Function matrix

Method

The dress is made out of two different denim fabrics that are both presented as they are. The raw edges highlight the nature of denim and the different hues show that there has been no additional processes involved in the production of the dress such as dying. The process of making the dress is also visually very understandable, since all the seams have been topstitched together in an effective and yet durable way. Therefore, the tools that have been used for the production have also been quite general, without needing to result to more complex methods of production. There is also a clear handcrafted element to the design since the upcycled materials have to be collected and sorted mostly by hand in order to make any products from them. This can be quite a consuming process, so it does make sense that the actual process has been achieved effectively.

Use

The garment works in its context of use. This context is casual wear where the garment will perform quite well. Also at the design level the garment works in different situations. As a material denim is comfortable and durable which will endure different kind of wear and stay in its shape. The form of the garment also works in casual context, where the user might have to sit or stand during the day for a longer periods of time. The looser fit

of the garment makes it more comfortable to wear. It can be also accompanied with other pieces of clothing such as cardigans or tights if the climate requires it. First and foremost, fashion is a way of communication and in this case the garment has a clear point of view or message that is both considerate and effective if the viewer is aware of the upcycling perspective of the garment. If we were to consider the garment as clothing, it also offers protection and is appropriate to wear even in the workplace.

Need

The most obvious need that the garment satisfies is need for identity. The dress has a certain visual impact that makes it possible for the user to identify themselves within the garment. In time one can see the changes in the materials which has the potential to have even an affective quality to the dress. As a piece of clothing, the dress satisfies the needs for protection and subsistence, the latter of which is about having material things. Since the dress is upcycled and it bears such marks of recognition towards the cause itself, the dress also provides understanding and participation.

In conclusion, it is clear that the dress has the potential to fulfil basic human needs to the extent that it is not a product that consumers are going to get just because it is in fashion. The dress has more intellectual properties that can enhance the experience of wearing such garment. It is at the same time economic investment and a chance to do some good for the environment.

Telesis

The dress achieves telesis in terms of its use of upcycled materials and creates more awareness of the situations due to the way they have been processed in the design. The goal of the design is to make consumers more aware of the situation in fashion and textile industry where usable materials are being thrown away as a default. The design reflects the current situation and succeeds in transforming used textiles into something of a higher quality with a chance of longer life. In a way the process of production also attempts to follow the processes found in nature, where the energy from end-of-life is brought back to circulation.

Association

I can associate myself into this dress since as long as I can remember I have worn jeans. To take that material and transform it into another piece of clothing that can be put into production is difficult. All the struggles are worth it though, since I can relate many memories and emotions into denim where it is rare that use actually transforms the material in a beautiful way. In our culture denim has been many times associated with work wear due to its durability and Reet Aus's upcycled dress has definitely same qualities. In addition to these qualities, the dress has added value that comes from sustainable background. Using post-consumer waste and reinvigorating it back to the cycle has had previously associations of ragged clothing that have nothing to do with fashion or something someone would want to wear, let alone buy for. In this case the dress does not only transform the old worn-out jeans into materials that can be seen as beautiful, it also does it in a manner that highlights the materials and the stories it has. One can see the patina in the patchwork pattern and wonder who has used the material before.

5.2.5. Case 5. Upcycled outfit by Amandah Andersson

Aesthetic analysis

Observation

The look consists of a loosely fitting top and high-waisted shorts. The top has 3/4 length sleeves that are made from white fabric that has been pleated horizontally. The pleats have differences in spacing and in size. The fabric looks like a slightly shiny shirt cotton, since the pleats have such sharp tailoring. In total there are at least 35 pleats in each sleeve. The pleats make the sleeves more robust hence they form a rounded shape from the shoulder down. The middle part of the top has a textured effect made from torn and distressed denim. Denim's primary colour is dark blue with fraying edges that are lighter blue. The middle portion has been almost like quilted with denim strips and then top stitched. Lines of the strips are going in different directions with the ones at the side and on the top going vertically and the middle going diagonally. In the middle portion on top of the texture there are five loops of distressed denim strips. These loops are sewn at the ends to the garment and they are pointing slightly downward. The top has a high collar



Case 5. Upcycled outfit by Amandah Andersson (2014/2015)

that is made from the white shirt textile. The hem of the shirt is shaped like it has two rounded shapes and a space in the front, where the top is at its shortest. At the sides of the hem there are slits. It also looks like the back of the top is longer, since there is a flap showing behind the model. The white shorts are made from same kind of material as the sleeves and the collar. The shorts are slightly flared and the edge of the pant leg is fraying.

Differentiation

Different parts of the outfit are the sleeves, the middle portion of the top, the loops in the front, the collar, the shorts and the back piece behind the model. In total there are six parts that are separated by their materials and colours, textures and shapes. The sleeves have a different texture from the shorts even though both of them are made from the same material. The loops in the front also stand out from the denim texture because of their shape. Visually the parts of the outfit are very different even though they are in relationship with each other. Most dominant part is the middle texture with the sleeves coming close to second. The rest of the parts are less noticeable. There are two kinds of relationships in the form. Firstly, the white parts are connected due to the similarity in colour and textile. Secondly, the relationship is formed by the denim in the front of the outfit that is visually the most dominant part of the form. There is also some dialogue between the textures front and the sleeves due to the techniques that create lines to the form.

Even though there are many things happening in the design, the parts of the dress come together quite well. The denim can be associated with the white material due to the use of techniques and as a whole the form looks balanced. The volume at the top is also balanced by the shape of the shorts so that the overall the look does not become too heavy. Also the colours have a definite effect on the weight of the look and if it had been done in a darker colour, the whole form would suffer. As for the order of the parts, I saw first the middle part with textured denim and after that the sleeves. I think that the texture has such a great visual impact which is why the eye goes there first. The denim is also darker than the rest of the look, which is why it jumps out of the photo. The sleeves have also a great visual impact in the shape and the technique.

The visual result of the form is balanced and interesting. There is much going on with the shape of the garment, textures, techniques and colours. The curves of the shapes seem to balance the garment in a way where the form is not overwhelmed by all of the design details. Overall the form is quite complex but in a way it still all comes together.

Interpretation

The form of the outfit is complex and yet intriguing. The visual impact of the look is strong even with all of the textures, shapes and materials. The look also feels very expensive. There is a beautiful sharpness to the pleats in the sleeves that balances the raw nature of the denim texture. Most of the shapes in the top are curved which in design respect is much harder to accomplish than square shapes. Even that alone tells that the design details are carefully considered. There is also an element of surprise in the look that are the loops of denim in the front which are cleverly hidden at first glance. The only part that does not necessarily compliment the rest of the look is the raw edge of the shorts. With the white fabric the tailoring has been so strong everywhere else so that the leg of the shorts seems like a small mistake. The visual themes is the look remind me of changes of season with ice melting off. The white against the rough texture of denim kind of showcase the power of the white, as if it really was ice and it was dragged off from the middle exposing the effects underneath.

The overall feeling of the garment is sophisticated with an edge. The fabrics and materials in the look are being elevated through the techniques and sharp tailoring which gives impression of higher quality. Still one can almost tell that the materials are upcycled where essentially old materials are transformed into new garments.

Evaluation

The apparel-body-construct relates to the current fashion. There are many elements in the form that have been in style recently. Especially shorter crop tops and shorts have been seen in many fashion shows. What is unique about the garment is the juxtaposition of volume and textures that separate it from other creations of similar nature. The garment also has a story to tell which is about the power of change. Changing the industry will be hard and currently the practices are damaging the textiles to the point where quality is decreased with each season. As a message, the garment highlights this

fact and speaks for using waste materials and using less damaging processes of production. Even the loops in the front can be seen as the hanging tags of garments and if we are to interpret the message literally, this garment contains materials from five upcycled garments. The use of loops is quite unexpected yet effective in terms of sustainability, since they make the viewer wonder what is going on. The only thing that is missing from the garment is the sense of person or individual who is wearing it. But even without that I think it is possible to have emotional connection to the garment especially if the garment has such an effective story to tell. Overall the garment is very unique and one can tell that it has taken many hours to construct it. The design details are also very successful in conveying meaning to the viewer.

Function matrix

Method

Materials used in the look are shirting material and denim. Both of them have been used in a way that does not disguise them but rather shows their properties. The white shirt material is used in a clean and finished manner with one exception which is in the leg of the shorts. The denim, on the other hand, has its raw edges showing which creates the texture in the front of the top. The processes that have gone on to the production are quite labour intensive based on the form of the garment. There are two different techniques applied within the top the first of which is the texture with the denim. The technique is not so difficult since it mainly involves top stitching small strips of denim onto a fabric. That being said it still takes some time, since the materials have to be cut, distressed and sewn in a pattern formation. The second technique is even more difficult since it involves horizontal pleating with the shirting material. The rest of the outfit is sewn together using regular methods. In conclusion, the processes used in the garment are difficult and time consuming but they have an effect that highlights the qualities of the materials.

Use

The garment performs well in its context of use. The form of the garment is very complex yet balanced which is why especially the top can be used in many occasions. The shorts, on the other hand, are less sophisticated, which is why they are appropriate for more

casual occasions. With the shorts the outfit can be considered as casual wear. However, if we use just the top and combine it with a longer dress or trousers, we get a look that easily works even in more dressier events. The design of the garment is the main force that carries the garment and makes it so unique.

One can examine the look as a communication where the fashion elements speak of the time and place of design. The design is very current but due to its uniqueness it also has classical elements that transcend it towards the future. As a communication, the look also has a message that is visible in the form. This message is about sustainable design practices where the goal is to create things that bring more awareness to the consumers of the unsustainable practices in fashion industry today.

Need

The look has the potential to satisfy the needs for subsistence, protection, identity, participation and understanding. The need for subsistence is satisfied by having something material which in this case is clothing. Clothing also provides protection. In the outfit the top is the more pronounced piece of clothing that will provide protection not only because of the volume but also because of the shape. The shoulders and sleeves of the top can be seen as an armour that may give the user a sense of being protected. Identity and participation have much in common with the fashion aspect of the garment, where the user can feel like the garments reflects current situations in society and yet it is unique enough to enhance the identity of its wearer. With continued wear the identity of the user may even start to have an effect on the outlook of the garment with denim fraying more. Lastly, the garment also satisfies the need for understanding given that the message of the garment is understood. Although the garment is influenced by current fashion, the main motivation behind wearing such a garment can come from a actual need for it. It certainly has the potential to fulfil many basic human needs.

Telesis

As mentioned earlier, the garment is current and it reflects the state and conditions of society. These conditions are the desecration of materials and treating them like they are not worth much. As an upcycled product, the garment succeeds in transforming the materials into higher quality and presents them in a way that increases their visual

impact. As an example of upcycling, the garment also tries to imitate the processes found in nature where the end-of-life of a one product becomes an opportunity for a new one. One can even see that if we were to reach the end-of-life of this garment the pieces of it could be reused for another product.

Association

I associate the design of the garment with change due to the visual impact and techniques that are used in the form. Even though the production may be quite labour intensive, the result can still pay for those costs especially if the garment stays in use and inspires people to change their consumption behaviour to be more sustainable. The garment also has potential to educate consumers about the issues dealing with textile waste and showcase the fact that even waste can be desirable and beautiful.

5.2.6. Case 6. Upcycled knit dress by Orsola de Castro

Aesthetic analysis

Observation

The outfit is a short knit dress with long sleeves. The dress is tight fitting and it has a wide and slightly rounded boat shaped neckline. The dress is made out of seven different coloured knitted pieces with colours varying from light grey to darker grey, three different shades of blue and black. The material of the knit looks like a thin jersey. The pieces of different coloured knits are placed across the bodice and the sleeves and they seem to be shaped like squares. In total there are six squares in the front of the dress with the addition of each sleeve containing three more pieces. All of the square pieces are joined together by the blue knitted trim that circles around each piece. The blue trim has a straight vertical line in the front of the dress with the rest of the lines going horizontally. In total there are three evenly spaced horizontal lines of blue knit that start just below the chest and go all the way to the hem. The same pattern repeats in the sleeves. In the front of the hem there is a square shaped piece of blue that joins the lines front the sides of the dress as well as the one vertical line that is in the front of the dress. In some of the seams and in the neckline one can see some stitches.



Case 6. Upcycled knit dress by Orsola De Castro (2011)

Differentiation

The form of the dress consists of thirteen parts. These are all the different coloured square pieces and the blue trim counting as one. Even though the blue trim consists of separate pieces, visually it makes more sense to count it as one. The most dominant part of the dress is the blue trim. After that comes the two darker coloured knit pieces on the left side of the bodice and the rest of the square pieces in the bodice followed by the pieces in the sleeves. The different parts appear separated due to the colours and the shapes. There is a certain relationship between the square shaped knit pieces and the blue trim that connects all of them together. First of all, the colours of the form are all quite similar with greys and blues. All the shapes are also similar which creates an effect of cohesion on the dress that is visually very simple. The blue trim also provides cohesion to the form because it is of similar width. The only thing breaking that cohesion are the seams in the front of the trim, which do not make sense visually. The form of the dress is simple in theory and in this case the complexity of sewing details is a bit distracting. As a visual result, however, the parts fit together and there are no surprises.

Interpretation

The upcycled knit dress is a wearable casual garment that has a surprisingly strong visual effect. The silhouette of the dress is nothing new as many of us have seen or even own knit dresses of similar nature. That does not mean that the shape is bad, it just means that the dress has classical elements that stay on style season after season. The form seems very casual and easy to wear with different ensembles.

The intention of the designer is very clear in the garment that is obviously meant for production where it is essential that different kinds of knits can be used effectively. The designer has known how to incorporate many different types and colours of knit, which is partly what makes the outfit special. Overall the use of colours and shapes in the form make visually sense. As an upcycled design, the use of different knits in the simple pattern also gives many other ideas and possibilities of how one could salvage old knits into new formations.

Evaluation

The apparel-body-construct relates to the culture and fashion through the use of materials that can be found on many other garments of similar nature. The silhouette, as mentioned before, is conventional, whereas the use of different knits and the way they are presented is what makes the dress special. This kind of treatment also has a positive effect on the individual expression. However, from a design's perspective, the dress falls short on the finishings. Visually the unnecessary seams especially in the blue trim are distracting. Of course when a designer is using a technique such as upcycling it may be impossible to limit the seaming if the textile pieces are too small to use otherwise. As a designer I feel that in that kind of situations there should be a design solution that takes the size of materials into consideration. Therefore, in this case the form is not unique enough even with the use of different knits. Also what comes to the message, the garment does not have that powerful of an impact as an upcycled piece. That being said not all clothing has to have a message that is so blatantly visible in the form. In conclusion the upcycled knit dress is more of an understated but functional piece that fits to its context of use.

Function matrix

Method

In the look the materials that have been used look like what they actually are. The different coloured knits have also been attached using traditional methods of construction, which in terms of processes is quite simple. In order to use upcycled materials in the production, there has also been processes that go into selecting such materials that is probably the most time consuming part of the process. It is clear that the textiles are still in their original form, which from a sustainable perspective, does not have such a great impact on the environment than if we were to recycle the textiles into a new knit. In conclusion the methods used in the dress are easy in terms of the production and they showcase in the design.

Use

The knit dress is a form of casual wear and as such it fits to its context of use. It fits many body-types and can be paired with different accessories. If we consider the colour of the

dress, it is clearly more winter or fall coloured piece of garment. The knits are also quite warm and comfortable to wear. As a fashion item the dress can function as a communication aid. While it does not necessarily give an impression of being a form of upcycling, it still has the potential to enhance the qualities and personality of its wearer.

Need

The dress satisfies the needs for subsistence, protection and identity. As a material item, the dress satisfies the need for subsistence which has to do with owning things such as in clothing. Clothing also provides protection essentially by providing warmth to its wearer. As a material, knit fulfils this need well since it is both warm as well as breathable. The need for identity is closely related to fashion and as such the knit dress does have the potential to satisfy its user in the sense of enhancing their personality. Therefore, the dress satisfies social needs that are closely related to the functions of fashion and even though the dress has fashion element it can be also seen as a functional item that is not driven only by only external needs.

Telesis

Telesis in the design has to do with being current and reflecting the conditions of society. As I have concluded before, the dress as a fashion item is current, since it has definite classical qualities that do not go out of fashion too quickly. However, as a message, the dress does not have strong reflecting qualities that would speak about the state of society or culture. Nevertheless, even without the visual message, the dress as an upcycled product does have an impact on the way materials are being used and to the awareness of sustainable design strategies. These qualities speak of the using waste materials and not wasting resources.

Association

I associate the knit dress with the using of waste materials in the fashion industry. The design of the dress is quite successful in the respect of using multiple different materials in the effort to create a considered and cohesive look. I can also appreciate the fact that the dress is very easy to wear. Even though the dress has been designed for the season 2011, it still has not lost its visual impact as a fashion item which speaks for classical garments.

5.3. Comparing the results

The analysis of the six cases showcased that there were many similarities in terms of aesthetics and function that correspond with the principles of sustainable design as well as fashion theories. I will examine some of the main themes that were visible in the cases and try to answer the research questions I posed in the introduction of the thesis. The focus of the analysis is on the different strategies and how they influence the overall quality of design.

In terms of fundamental human needs, many of the examples have the potential to satisfy at least some of them. In all of the cases there was a certain divide in the way the outfit as clothing and as a fashion piece satisfies needs. As a tangible item, clothing has the potential to satisfy needs for subsistence and protection. Subsistence can be satisfied by having something tangible according to theory of fundamental human needs by Manfred Max-Neef³²⁶. The need for protection has to do with the function of the clothing. It can be achieved by either through material " *that is both durable as well as resilient that protects its user*"³²⁷ or through the shape of the clothing. In terms of the different cases all of them can satisfy these needs, but depending on the situation and function certain outfits obviously perform differently. One thing that I noticed in the process of analysing was that there are different ways to satisfy certain needs. "*The important thing to notice that there are many ways to fulfil certain needs that may be dependent on the way their users perceive the world and not all needs are manifestations of the tangible world.*"³²⁸

There were clearly more differences between the different cases in terms of satisfying needs that correspond with fashion and aesthetics of clothing. Generally most of the designs that were a part of the analysis have the potential to satisfy the needs for identity and participation. Obviously not all the users may feel like the garments reflect their personal identity or need for participation, since there are so many different kind of consumers who all have their own opinions about fashion and clothing and what suits them best. However, there was a noticeable pattern that had an effect on the need for identity. If the garment had a strong visual impact on the viewer it was more likely that

³²⁶ Max-Neef, 1992.

³²⁷ Case 1. Zero waste dress by Titania Inglis.

³²⁸ Case 3. Zero waste dress and harness by Ada Zanditon.

the garment can satisfy the need for identity³²⁹. Some of the cases also have the potential to satisfy the need for understanding in terms of what the message of the outfit is and how it reflects current situations and sustainability. Especially the pieces with stronger message on sustainability can have an influence on understanding for example the designs from Reet Aus, Amandah Andersson and Titania Inglis.

In addition to the needs listed before, some of the examples have also the possibility to satisfy other basic human needs. In the case of Bolor Amgalan the design of the clothing makes it possible to change the outlook of the garment, which is why it can satisfy the need for creation. Another need that corresponds with the need for understanding is the need for affection, which also has to do with powerful aesthetics in relation with the materials and the processes. Therefore in order to get to the level of affection the design has to be quite accomplished. According to the analysis the cases that are most likely to satisfy the need for affection are the zero waste design by Titania Inglis and the upcycled design by Reet Aus.

The context of use between the different cases varied and in terms of successfulness there were no major differences between the two strategies. On the one hand some of the garments were distinctly designed for casual occasions which in terms of functionality also reflected in the form of the outfits. For example in the upcycled dress designed by Reet Aus both the material and the form increase the wearability of the garment in different situations. The dress designed by Orsola de Castro also has a wide context of use that is created by the form and simple silhouette that fits many body-types and can be easily worn with other garments and accessories. In addition to these examples also the zero waste dress designed by Titania Inglis could be worn in more casual situations. On the other hand some of the pieces were clearly designed for dressier occasions which was mainly reflected in the material choices and complex techniques. For example the zero waste evening dress designed by Ada Zandoni and the upcycled outfit by Amandah Andersson displayed very complicated uses of materials that had an influence on the overall function of the garments. The only example with no clear context of use was the zero waste garment designed by Bolor Amgalan that instead focus on function still

³²⁹ Case 4. Upcycled dress by Reet Aus.

displayed more communicational values of fashion and innovative uses of new techniques.

In terms of aesthetics, the different strategies manifested a wide range of expressions. If we consider the model of aesthetic response according to DeLong, the model is divided into three parts the first of which is the form³³⁰. In most of the cases the form was harmonious and the different parts were in cohesion. Examples of these are zero waste dress and harness by Ada Zanditon, the upcycled knit dress by Orsola de Castro and the upcycled design by Reet Aus. There were also designs where the form was clearly contrasting. Such examples were the zero waste dress by Titania Inglis and the upcycled outfit by Amandah Andersson. In the case of Bolor Amgalan the use of different materials and techniques resulted in contrasting aesthetic form while it still had an element of cohesion in terms of colours. *"In terms of visual result the outfit is quite complex that is partly created by all the different parts in the form. The different textures, shapes and materials add to the complexity of the look. However since the outfit has a similar colour story it helps in tying the look together."*³³¹ Overall in some cases the visual result was simple and in others quite complex. Both of the strategies had examples in each category.

The element of fashion is also visible in each of the examples. In many of the cases fashion has influenced the actual shape and silhouette of the clothing. For example in Bolor Amgalan's as well as in Amandah Andersson's designs the tops were short, which has been in fashion for a while. *"There are many elements in the form that have been on trend recently. Especially shorter crop tops and shorts have been seen in many fashion shows. What is unique about the garment is the juxtaposition of volume and textures that separate it from other creations of similar nature."*³³² Also in terms of silhouette the knit dress designed by Orsola de Castro has a conventional shape that is seen in fashion season after season. One could also argue that the loose fitting dresses could also be considered as being in fashion. Examples of these were the designs by Titania Inglis and Reet Aus. In the evening dress designed by Ada Zanditon there were many qualities that pointed also towards traditions and history of fashion. In terms of its aesthetics the overall result was quite heavily influenced by what we consider beautiful which in the end

³³⁰ DeLong 1998, 9-11.

³³¹ Case 2. Zero waste outfit by Bolor Amgalan.

³³² Case 5. Upcycled outfit by Amandah Andersson.

may not be such a good presentation of sustainability. *"On some level the appearance of the outfit is defined by social values that have an influence over what things we consider beautiful. As a fashion item the outfit does not contradict our aesthetic preferences but rather conforms to them."*³³³

Even if some of the aesthetics were influenced by the current fashions, the overall impression of the cases pointed towards classic items. These features were mostly achieved by using classical silhouettes and high-quality materials. Most of the outfits in the examples could be categorized as being classics. These examples include designs from Titania Inglis, Ada Zanditon, Orsola de Castro and Reet Aus. On some of the cases the design was so strong that raised them from being classic into unique items. The element of uniqueness was traced in designs from Titania Inglis, Bolor Amgalan, Reet Aus and Amandah Andersson. In the case of Amandah Andersson the analysis determined that while the fashion elements tie the design into current time, the unique qualities of the design also prolong the life of the garment. In some of the cases uniqueness had to do with the way materials had been treated which was the case in outfits from Titania Inglis, Reet Aus and Amandah Andersson. In others uniqueness was created by using complex techniques and fabric manipulation skills, like in the outfits by Bolor Amgalan and Ada Zanditon. In the case of the latter *"the use of materials and techniques make the form more unique. These details increase the aesthetic durability and extend its uniqueness beyond just being a classic."*³³⁴ So in conclusion the sense of uniqueness was achieved in most of the examples by using materials in the combination with techniques that made the garments stand out from others even within the same production line.

In terms of design, most of the cases were very successful and the design details were well constructed. There were no great differences between the two strategies, but in terms of aesthetics and use of materials there were slight differences. For example in the zero waste design by Titania Inglis, the overall value of design was increased by using high quality materials. In addition to materials, all of the design details were carefully considered which increased the aesthetics and function of the clothing. Also in the upcycled outfit designed by Amandah Andersson the design details were for the most

³³³ Case 3. Zero waste dress and harness by Ada Zanditon.

³³⁴ Case 3. Zero waste dress and harness by Ada Zanditon.

parts successful which contributed to the clothing being able to transfer meaning. However, there were also a few mistakes that decreased the overall effect of design in some of the cases. Especially some of the finishings were done hap-hazardly especially in the knit dress that was designed by Orsola de Castro. In the example the use of waste materials is the reason why the overall design is decreased. One notable factor in the designs was also the use of many different materials in order to achieve a look. In most of the cases there were very successful uses of multiple materials that all seemed to go together in the attempt to create cohesion.

In some of the examples the focus of using waste materials and different techniques contributed to creating innovation in the designs. A good example of innovation was the zero waste design by Bolor Amgalan, where the design concept was built upon creating new interesting materials. While the design itself may have lacked in functionality, the value and quality based on the innovation increased the design aspect of the outfit. It also provides options as to how the user can change the placement of details. Also in the zero waste evening dress designed by Ada Zandoni the innovative use of leather added to the overall design of the garment. All in all different kinds of innovation were used in both of the strategies. While the zero waste designs certainly paid more attention to the ways the materials could be used more thoroughly the focus of upcycling was more concerned about transforming the materials into something of a higher quality. There were also exceptions to this rule and the overall expression was that there should be something new to the design element that would have a positive effect on the overall result of the garments.

Durability has to do with creating lasting value that has an effect on the user on an emotional level. In the examples durability was achieved either by selecting durable materials or by creating emotional bonds with the users. In some of the cases durability was created by using both. Especially in the dress designed by Titania Inglis the use of durable materials such as leather and creating a story behind the treatment of stains was very successful in terms durability. *"Since the dress carries such a strong message of finding beauty in stained things it may have an effect on the emotions of its user. This message may also provide some understanding about what it means to be sustainable in*

fashion industry."³³⁵ In many of the cases the materials were the contributing factors in creation of durability. For example denim was used in two of the upcycled outfits as main material where it had certain added emotional value to the overall durability of the garments. Especially in the upcycled dress designed by Reet Aus durability and emotional bonds were clearly related to the material selection and the way it had been used in the design.

In the use of zero waste strategies there has been some variations between the three cases. Although in most of the examples the use of zero waste design strategy has been successful there has also been some areas where the strategy has not been used. For the most part zero waste has been employed into the patternmaking that eliminates the waste in the production stage. Such examples are the draped evening dress designed by Ada Zanditon, the top portion of the dress designed by Titania Inglis and the outfit designed by Bolor Amgalan. In each of these examples patternmaking also has an effect on the aesthetics of the clothing. The second approach of zero waste had to do with techniques and material manipulation where the goal is to create different surfaces thus eliminating any waste from the process. For example in the leather harness designed by Ada Zanditon, the designer has been able to use even the smallest pieces of material in a cohesive way that also showcases the qualities of that material. Also Bolor Amgalan has used this technique approach in the creating of folded box shapes in the garment. According to the analysis *"The processes are more complex since there has been clear efforts of how to implement zero waste design strategy into them. The most complex process has probably been figuring out the technique of producing the box material where the shape is three dimensional."*³³⁶ The only case where zero waste has not been used in the whole outfit is the design by Titania Inglis. In terms of that example the problems derive from using leather in a rather simple design where *"there is some amount of wastage coming from the process due to the desire to keep the silhouette and shapes of the dress as simple as possible"*³³⁷ So in the example the designer has chosen to omit from using zero waste principles in order not to decrease the aesthetics and the design of the outfit.

³³⁵ Case 1. Zero waste dress by Titania Inglis.

³³⁶ Case 2. Zero waste outfit by Bolor Amgalan.

³³⁷ Case 1. Zero waste dress by Titania Inglis.

Upcycling has been used in the three examples where the focus is on increasing the quality of materials through design. In terms of processes using upcycling is more intensive than designing products from virgin materials, which is also reflected in the analysis. *"There is also a clear handcrafted element to the design as the upcycled materials have to be collected and sorted mostly by hand in order to make any products from them. As a process this can be quite consuming so it does make sense that the actual process has been achieved effectively."*³³⁸ In the analysis of the knit dress designed by Orsola de Castro there also was a notion about the importance of being able to use the textiles in their original form without having to result into heavier processes of recycling, which in terms of sustainability is a better approach. *"It is clear the textiles are still in their original form which from sustainable perspective does not have such a great impact on the environment than if we were to recycle the textiles into a new knit."*³³⁹ If we were to analyse the form and aesthetics of the examples the material has quite a big influence on the form of the clothing. Especially in the upcycled dress designed by Reet Aus the material determines the shape of the clothing. There has also been a focus on techniques where a good example is the design from Amandah Andersson. In the design the designer has succeeded in increasing the quality of the materials through use of textile manipulation. *"As an upcycled product the garment succeeds in transforming the materials into higher quality and presents them in a way that increases their visual impact. As an example of upcycling the garment also tries to imitate the processes found in nature where the end-of-life of a one product becomes an opportunity for a new one."*³⁴⁰

During the analysis, there were other things that reflected in the aesthetic form of the outfits. One such interesting character about the strategies and how they display sustainability was the message that is a part of the aesthetic response. At least three of the examples seemed to carry quite powerful messages that could potentially have an effect on the viewer of the garments. For example the dress by Titania Inglis while having a simple form managed still to transfer a strong message about the sustainability efforts and the way we see beauty in general. *"As a message the dress showcases that there are*

³³⁸ Case 4. Upcycled dress by Reet Aus.

³³⁹ Case 6. Upcycled knit dress by Orsola de Castro.

³⁴⁰ Case 5. Upcycled outfit by Amandah Andersson.

different kind of definitions as to what one can consider beautiful."³⁴¹ Also Reet Aus had a strong message in the upcycled dress that has to do with recycling old textiles in a way that is also reflected in the aesthetics of the clothing. Also the design by Amandah Andersson had a message that was very close to the upcycling in a philosophical level. *"Changing the industry will be difficult and currently the practices are damaging the textiles to the point where quality is decreased with each season. As a message the garment highlights this fact and speaks for using waste materials and using less damaging processes of production."*³⁴² Overall my impression was that in terms of different strategies the upcycled examples had a definite emphasis on the message whereas the zero waste strategy showcased more on the design and innovative level.

If we compare the different strategies and the way they influence the design process and the result, there are certain differences. Like stated in the case of Titania Inglis zero waste *"speaks for valuing the materials we use in the fashion industry"*³⁴³. These textiles can be made from virgin materials or they can be either recycled or waste material. In upcycling the whole design strategy is based on the use of recycled or waste material which gives it an upper hand in terms of sustainability. However, if we consider the design process, in zero waste the potential waste is being eliminated whereas in upcycling there might be some leftovers that are not used in the production stage of the garments. Also in terms of processing upcycling can be more demanding which was also pointed out in the analysis of the upcycled examples. In terms of design processes the strategies are different and the end result in all of the cases speaks for sustainability especially in the way both strategies value the materials used in the process.

In addition to design process, there are also differences in terms of how the different strategies affect the function and aesthetics of the clothing. In zero waste the aesthetics are heavily influenced by either the pattern, draping or use of techniques whereas in upcycling the way designers use the materials can vary substantially more. Of course in upcycling the material also affects the design process and it is essentially the starting point of every design process, but not as dramatically as in zero waste strategy. Both of the strategies also carried pieces of clothing that had strong messages that were mainly

³⁴¹ Case 1. Zero waste dress by Titania Inglis.

³⁴² Case 5. Upcycled outfit by Amandah Andersson.

³⁴³ Case 1. Zero waste dress by Titania Inglis.

communicated through aesthetics. While zero waste had a focus on delivering innovation and lasting fashion pieces, upcycling took the approach that was directed towards educating consumers about the problems of fashion industry. However, in terms of function there were no distinct differences between the two strategies. This could be because of the cases that were selected into the analysis were in some level quite similar. There were no distinctly more functional examples in the analysis and rather the differences had to do with the context of use, which in each case was obviously different. However, one notion during the analysis was that in all of the cases the methods that were used were quite intensive which could potentially decrease the functionality of the clothing. All in all, the use of different design techniques had an effect that could be seen as increasing the overall sustainability of the pieces.

6. Conclusion

In order to distance the society from unsustainable practices we need powerful approaches that can be used to bring holistic change to our way of living. Sustainable design strategies can be viewed as approaches that break down the theory of sustainable design into approaches that are both understandable and manageable. Nevertheless, one should note that in no respect are the strategies complete and even amongst them there are practices that could be performed better and more effectively. In the fourth chapter I discussed the strategies in terms of waste management, which in current society is a huge part of the sustainability agenda. There I stated that the most common way of handling the waste is still considered downcycling, where the quality of the material loses parts of its true potential. John Ehrenfeld suggests an interesting pattern of thought where he states that we should change our perspective on waste management completely since currently we are only "playing catch-up and clean-up".³⁴⁴ Also Rissanen disapproves of recycling as the ideal form of waste management. According to him, recycling the 10 to 20 percent fabric waste that is coming from production is not a solution that solves problems since essentially it means a loss in quality and extra resources put into the processes of recycling.³⁴⁵

The reasons why we are so concerned about waste management is due to the upheld view that the fashion industry cannot change its ways, when in reality the change is needed in order to achieve sustainability. Rather than focusing on the problems, we should seek ways in which we can renew the practices of industry from within. One could argue that as strategies upcycling and zero waste place in the middle of this process. This is partly because they still have a focus on the waste management. For example in upcycling the material is either pre-consumer or post-consumer waste, which as a practice does not bring true change to the system as a whole. Zero waste, on the other hand, has a focus of total waste elimination which as an industrial practice would bring change to the way waste is being created. McDonough and Braungart argue that waste elimination on the design level means that there are only processes involved in which the

³⁴⁴ Ehrenfeld 2015, 60.

³⁴⁵ Rissanen 2013, 10.

concept of waste does not exist³⁴⁶. This notion has to look into the product's whole life-cycle in order for it to stand true to its meaning. Still placing the strategies on this spectrum is not as straight-forward since we also have to consider the effects of design of those strategies and how they contribute to the cause as well as to the consuming habits in general. Also in some cases different strategies are being used together to increase the potential of sustainability and design. As evolved design strategies both of the approaches require knowledge of sustainable design and being able to include that into conventional processes of the fashion industry is not easy. Let alone if we consider the processes that go into selecting and processing materials in upcycling or figuring out the zero waste patterns that also correspond with the aesthetics and function of the clothing. All in all, the strategies require certain skill sets and vast knowledge about society in general.

The methods I used in the process fit into the frame of the thesis that was from the point of view of sustainable design. The first step of the analysis had to do with examining the aesthetics of the garments where I used Delong's Aesthetic analysis as a reference. Utilising the method I was able to gather information about the visual form and interpret it in terms of sustainable design in order to reach the final evaluation. Function, on the other hand, was established through the Papanek's function matrix where the most notable sides were use and need. Firstly, use had to do with the context for which the garment was designed for, which in terms of function is essential. Secondly, how well the different cases could satisfy basic human needs was another contributing factor. In terms of clothing and fashion there were many differences that had to do with the things I discussed in the second chapter. While clothing had the potential to satisfy physical and practical needs, fashion corresponded more with the emotional needs such as identity, participation and affection. In the end I was surprised how much information I could gather from the different cases in the analysis. The material also reflected the same theories that I examined in the previous chapters which lead me to believe that I achieved something worth researching in the process.

The results of the analysis suggests that using different sustainable design strategies does have an effect on the overall aesthetics and function of clothing. Within sustainable design other important factors to take into consideration are also the qualities that

³⁴⁶ McDonough & Braungart 2002, 103-104.

enhance the durability and emotional attachment to the clothing. In many of the cases the strategies contributed to the quality of design where the emphasis was on delivering meaning to the user of the garments and increasing the quality of materials. In terms of the elements, aesthetics had more of an effect in terms of sustainability. A part of the reason may have been the way I picked the cases for the analysis, but even then the aesthetics seemed to be the design element that carried the message of sustainability. Function, on the other hand, was directed more towards the actual tangible object and how it works in practice. Even Postrel and Carbonaro speak of a new model of design where the "form follows function" has been replaced by "form follows emotion"³⁴⁷. This would suggest that in modern society there is an even higher need for intellectual, affective clothing and fashion.

While both of these elements are important, there is no denying that without a powerful visual agenda we as a society are not able to change our ways for better. To that end the question of aesthetics is essential, since it is what inspires and educates the viewer. According to DeLong, aesthetics "involves continual reference to what people value". She also adds that, while aesthetics rely in a certain aspect very much on the time and place, it also creates interest and involvement through sensing and feeling.³⁴⁸ This is why we also need fashion since it is essentially the factor that creates communication. Ultimately it is also the quality of design that is going to bring change especially in terms of aesthetics. According to Aakko, we should ask ourselves what kind of aesthetics would ensure longevity and durability in design. Working only within the principles of sustainability is not enough since the aesthetic side is necessary in order to convey meaning and emotions through clothing.³⁴⁹ Thus we can also look at sustainability via consumption. Hence the key in achieving a more sustainable future has more to do with changing people's behaviour. According to Chapman, consumers want products that are "more fulfilling, meaningful, fun and rewarding than the previous thing", which is why relying on the caring aspect is just not enough.³⁵⁰ Therefore, caring alone is not going to make a

³⁴⁷ Carbonaro 2012, 49; Postrel 2003, 9.

³⁴⁸ DeLong 1998, 2.

³⁴⁹ Aakko 2013, 41-42.

³⁵⁰ Chapman 2015, 80.

difference in terms of sustainability nor does it excite consumers if there is nothing else to the design of the product.

Fashion can be also approached from various perspectives, which was shown in the analysis. While there were some examples of fashion trends amongst them the overall impression was that the quality of uniqueness transformed the examples into timeless pieces. *"The uniqueness and individuality also speak for sustainable design in the respects of making garments that evoke emotions in its user."*³⁵¹ Already Rissanen speaks of strategies that have a focus on making visually durable garments that are not just based on the classic designs³⁵². Other important aspects are principles by which the garments are designed upon. According to Niinimäki, instead of focus on functionality and aesthetics, products should be evaluated based on the values they carry³⁵³. In the analysis some of these values were clearly visible, which added to the sustainability of them. *"The goal of the design is to make consumers more aware of the situation in fashion and textile industry where usable materials are being thrown away as a default. The design reflects the current situation and succeeds in transforming used textiles into something of a higher quality with a chance of longer life. In a way the process of production also attempts to follow the processes found in nature, where the energy from end-of-life is brought back to circulation."*³⁵⁴

During the research process the most problematic aspect of the thesis was the amount of information and research material I had gathered through the years I was working with the study. While certain aspects of sustainability in the design field and in fashion studies specifically were over-abundantly covered, gathering information about the actual frame of my study was not so easy, since there was not that much information about it after all. It seemed like most of the studies approached sustainability from the material point of view, whereas my research dealt with the design qualities from the point of view of aesthetics and function. Also in terms of sustainable design strategies, there were not that many studies that focused on the theory of the two approaches. Most of them were

³⁵¹ Case 4. Upcycled dress by Reet Aus.

³⁵² Rissanen 2011, 127.

³⁵³ Niinimäki 2013, 36.

³⁵⁴ Case 4. Upcycled dress by Reet Aus.

written from a specific designer's point of view which in the end did not go so much into the theory of the strategies as I would have wished.

In conclusion, the process of research was quite satisfying in the sense that I found answers to my research questions and was able to complete my objective. There was also a certain change of thinking that occurred during the process, where the background theory and the analysis started to have a conversation with each other. In terms of hermeneutics, such a process is expected and it plays true to the way information is being gathered in a circular pattern. While it is also good to know that my empiric experiences had an effect on the way I conducted the analysis, the overall results of the research still speak of the same issues that were visible in theories I unfolded for the research.

Bibliography

Aus, Reet (2011), *Trash/to Trend: Using Upcycling in Fashion Design*. Estonian Academy of Arts, Tallinn.

Barnard, Malcolm (2014), *Fashion Theory, An Introduction*. Routledge, New York.

Barnard, Malcolm (1996), *Fashion as Communication*. Routledge, London.

Ed. Black, Sandy, **de la Haye**, Amy, **Entwistle**, Joanne, **Rocamora**, Agnès, **Root**, Regina, **Thomas**, Helen (2013), *The Handbook of Fashion Studies*. Bloomsbury Publishing Plc, London.

Ed. Black, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Black, Sandy (2011), *Eco-Chic, The Fashion Paradox*. Black Dog Publishing Limited, London.

Brannon, Evelyn (2010), *Fashion Forecasting*. Third Edition. Fairchild Books, U.S.A.

Brown, Sass (2013), *Refashioned, Cutting-edge Clothing from Upcycled Materials*. Laurence King Publishing Ltd, London.

Bye, Elizabeth (2010), *Fashion Design*. Berg Publishers, Oxford.

Chapman, Jonathan (2015), *Emotionally Durable Design. Objects, Experiences & Empathy*. Second edition. Routledge, New York.

Ed. Chapman, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

DeLong, Marilyn (1998), *The Way We Look, Dress And Aesthetics*. Second Edition. Fairchild Publications, New York.

Eicher, Joanne, **Evenson**, Sandra, **Lutz**, Hazel (2008), *The Visible Self*. Third edition. Fairchild Publications, New York.

Ed. Ekins, Paul, **Max-Neef**, Manfred (1992), *Real-life economics, Understanding wealth creation*. Routledge, London.

Ellinwood, Janice (2011), *Fashion by Design*. Fairchild Books, New York.

Entwistle, Joanne (2015), *The Fashioned Body, Fashion, Dress & Modern Social Theory*. Second Edition. Polity Press, Cambridge, UK.

Entwistle, Joanne (2009), *The Aesthetic Economy of Fashion*. Berg Publishers, Oxford.

Ed. Fletcher, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Fletcher, Kate, **Grose**, Lynda (2012), *Fashion & Sustainability, Design for a Change*. Laurence King Publishing Ltd, London.

Fletcher, Kate (2008), *Sustainable Fashion and Textiles, Design Journeys*. Earthscan, London, Sterling, VA.

Folkmann, Mads (2013), *The Aesthetics of Imagination in Design*. The MIT Press, Cambridge.

Ed. Gardetti, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Gordon, Jennifer, **Hill**, Colleen (2015), *Sustainable Fashion: Past, Present, and the Future*. Bloomsbury, London.

Ed. Gwilt, Alison, **Rissanen**, Timo (2011), *Shaping Sustainable Fashion. Changing the Way We Make And Use Clothes*. Earthscan, London, Washington DC.

Ed. Hethorn, Janet, **Ulasewicz**, Connie (2008), *Sustainable Fashion: Why Now?, A Conversation About Issues, Practices, And Possibilities*. Fairchild Books, U.S.A.

Horn, Marilyn (1975), *The Second Skin, An Interdisciplinary Study of Clothing*. Houghton Mifflin Company, U.S.A.

Jones, Sue (2011), *Fashion Design*. Third Edition. Laurence King Publishing Ltd, London.

Kawamura, Yuniya (2005), *Fashion-ology, An Introduction to Fashion Studies*. Berg, U.S.A.

Kim, Eundeok, **Fiore**, Ann, **Kim**, Hyejeong (2011), *Fashion trends, Analysis and Forecasting*. Berg Publishers, UK.

Loschek, Ingrid (2009), *When Clothes Become Fashion, Design and Innovation Systems*. Berg Publishers, New York.

McDonough, William, **Braungart**, Michal (2002), *Cradle to Cradle: Remaking the Way We Make Things*. North Point Press, New York.

McLennan, Jason (2004), *The Philosophy of Sustainable Design*. Ecotone Publishing, Washington.

Ed. Muthu, Subramanian Senthilkannan (2014), *Roadmap to Sustainable Textiles and Clothing: Eco-friendly Raw Materials, Technologies, and Processing Methods*. Springer, Singapore.

Ed. Niinimäki, Kirsi (2013), *Sustainable Fashion: New Approaches*. Unigrafia, Helsinki.

Papaneek, Victor (1997), *Design for the Real World, Human Ecology And Social Change*. Second Edition. Thames and Hudson Ltd, London.

Papaneek, Victor (1995), *The Green Imperative, Ecology and Ethics in Design And Architecture*. Thames and Hudson, London.

Postrel, Virginia (2003), *The Substance of Style*. HarperCollins Publishers Inc., New York.

Rissanen, Timo (2013), *Zero-waste Fashion Design: a study at the intersection of cloth, fashion design and pattern cutting*. University of Technology, Sydney.

Sproles, George, **Burns**, Leslie (1994), *Changing Appearances, Understanding Dress in Contemporary Society*. Fairchild Publications, New York.

Walker, Stuart (2006), *Sustainable by Design, Explorations in Theory and Practice*. Earthscan, London.

Ed. Welters, Linda, **Lillethun**, Abby (2011), *The Fashion Reader*. Second Edition. Berg, U.S.A.

Yurchisin, Jennifer, **Johnson**, Kim (2010), *Fashion and the Consumer*. Berg, U.S.A.

Articles

Aakko, Maarit, **Niinimäki**, Kirsi (2013), *Experimenting with Zero-Waste Fashion Design*. p.68-79 in **Ed. Niinimäki**, Kirsi (2013), *Sustainable Fashion: New Approaches*. Unigrafia, Helsinki.

Aakko, Maarit (2013), *What is the Role of Aesthetics in Sustainability?*. p.38-43 in **Ed. Niinimäki**, Kirsi (2013), *Sustainable Fashion: New Approaches*. Unigrafia, Helsinki.

Allwood, Julian, **Laursen**, Søren, **Rodriguez**, Cecilia, **Bocken**, Nancy (2006), *Weaving a New Future, from Well Dressed? The Present and future sustainability of clothing and textiles in the United Kingdom* Institute for Manufacturing; Cambridge, UK. p.582-585 in **Ed. Welters**, Linda, **Lillethun**, Abby (2011), *The Fashion Reader*. Second Edition. Berg, U.S.A.

Anttila, Pirkko (1998), *Tutkimisen taito ja tiedonhankinta*. Retrieved in 10.01.2016. Link: <https://metodix.wordpress.com/2014/05/17/anttila-pirkko-tutkimisen-taito-ja-tiedonhankinta/#2.3.2> Hermeneuttinen tieteenperinne

Black, Sandy, **Eckert**, Claudia (2012), *Considerate Design: Supporting Sustainable Fashion Design*. p.92-95 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Brass, Clare, **Bowden**, Flora (2012), *Joining the Dots: Connecting Design to a Sustainable Future*. p.108-111 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Carbonaro, Simonetta (2012), *The Design of a New Prosperity*. p.48-49 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Cassidy, Tracy, **Han**, Sara (2013), *Upcycling Fashion for Mass Production*. p.148-163 in **Ed. Gardetti**, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Cataldi, Carlotta, **Dickson**, Maureen, **Grover**, Crystal (2013), *Slow Fashion, Tailoring a Strategic Approach for Sustainability*. p.22-46 in **Ed. Gardetti**, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Chapman, Jonathan (2015), *Prospect, Seed and Activate, Advancing Design for Sustainability in Fashion*. p.74-81 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Chapman, Jonathan, **Gant**, Nick (2007), *(In)conclusion*. p.137-144 in **Ed. Chapman**, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

Dunne, Lucy (2011), *Wearable Technology*. p.613-616 in **Ed. Welters**, Linda, **Lillethun**, Abby (2011), *The Fashion Reader*. Second Edition. Berg, U.S.A.

Earley, Rebecca (2012), *Sustainable fashion and Textile Design*. p.86-89 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Ehrenfeld, John (2015), *The Real Challenge of Sustainability*. p.57-63 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Ehrenfeld, John (2004), *Searching for Sustainability, No Quick Fix*. p. 1-13 in Reflections 5(8). The SoL Journal on Knowledge, Learning and Change. Retrieved in 9.3.2016. link: <http://www.johnehrenfeld.com/Reflections,%20Vol%205,%20No.%208,%202004.pdf>

Farrer, Joan (2011), *Remediation: Discussing Fashion Textiles Sustainability*. p.19-33 in **Ed. Gwilt**, Alison, **Rissanen**, Timo (2011), *Shaping Sustainable Fashion. Changing the Way We Make And Use Clothes*. Earthscan, London, Washington DC.

Fletcher, Kate (2015), *Other Fashion Systems*. p.15-24 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Fletcher, Kate (2013), *Design for Sustainability in Fashion and Textiles*. p.557-574 in **Ed. Black**, Sandy, **de la Haye**, Amy, **Entwistle**, Joanne, **Rocamora**, Agnès, **Root**, Regina, **Thomas**, Helen (2013), *The Handbook of Fashion Studies*. Bloomsbury Publishing Plc, London.

Fletcher, Kate (2012), *Sustainability, pleasure and fashion politics*. p.208-210 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Fletcher, Kate (2007), *Clothes That Connect*. p.119-132 in **Ed. Chapman**, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

Flugel, J (1930), *The Fundamental Motives*. Extracted from **Flugel**, J (1930) *The Psychology of Clothes*. International Universities Press, New York. p.16-24 in **Ed. Welters**, Linda, **Lillethun**, Abby (2011), *The Fashion Reader*. Second Edition. Berg, U.S.A.

Fuad-Luke, Alastair (2007), *Re-defining the Purpose of (Sustainable) Design: Enter the Design Enablers, Catalysts in Co-design*. p.19-52 in **Ed. Chapman**, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

Grose, Lynda (2015), *Fashion as Material*. p.223-233 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Grose, Lynda (2013), *Wisdoms from the Fashion Trenches*. p.47-60 in **Ed. Gardetti**, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Gwilt, Alison (2011), *Sustainable Fashion: The Points for Positive Intervention by the Fashion Designer*. p.59-73 in **Ed. Gwilt**, Alison, **Rissanen**, Timo (2011), *Shaping Sustainable Fashion. Changing the Way We Make And Use Clothes*. Earthscan, London, Washington DC.

Hethorn, Janet (2008), *Consideration of Consumer Desire*. p.53-76 in **Ed. Hethorn**, Janet, **Ulasewicz**, Connie (2008), *Sustainable Fashion: Why Now?, A Conversation About Issues, Practices, And Possibilities*. Fairchild Books, U.S.A.

Jack, Tullia (2013), *Fashioning Use, A Polemic to Provoke Pro-Environmental Garment Maintenance*. p.125-133 in **Ed. Gardetti**, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Kaiser, Susan (2008), *Mixing Metaphors in the Fiber, Textile, and Apparel Complex. Moving Toward a More Sustainable Fashion*. p.139-164 in **Ed. Hethorn**, Janet, **Ulasewicz**, Connie (2008), *Sustainable Fashion: Why Now?, A Conversation About Issues, Practices, And Possibilities*. Fairchild Books, U.S.A.

Kamenetzky, Mario (1992), *The Economics of The Satisfaction of Needs*. 181-196; in **Ed. Ekins**, Paul, **Max-Neef**, Manfred (1992), *Real-life economics, Understanding wealth creation*. Routledge, London. Retrieved in 12.3.2016. Link: <http://www.alastairmcintosh.com/general/resources/2007-Manfred-Max-Neef-Fundamental-Human-Needs.pdf>

Kokkonen, Yrjö (19.8.2014 klo 16:14), updated (19.8.2014 klo 16:17) *Maapallo soi jo tämän vuoden luonnonvarat - Suomen harva asutus sekä etu että haitta*. Retrieved in 12.01.2016. Link: http://yle.fi/uutiset/maapallo_soi_jo_taman_vuoden_luonnonvarat__suomen_harva_asutus_seka_etu_etta_haitta/7420168

Max-Neef, Manfred (1992), *Development and Human Needs*. p.197-213 in **Ed. Ekins**, Paul, **Max-Neef**, Manfred (1992), *Real-life economics, Understanding wealth creation*. Routledge, London. Retrieved in 7.1.2016. Link: <http://www.alastairmcintosh.com/general/resources/2007-Manfred-Max-Neef-Fundamental-Human-Needs.pdf>

McCarthy, Tessa (2008), *Zara: The Business Model for Fast Fashion*. p. 541-546 in **Ed. Welters**, Linda, **Lillethun**, Abby (2011), *The Fashion Reader*. Second Edition. Berg, U.S.A.

McQuillan, Holly (2011), *Zero-Waste Design Practice: Strategies and Risk Taking for Garment Design*. p.83-97 in **Ed. Gwilt**, Alison, **Rissanen**, Timo (2011), *Shaping Sustainable Fashion. Changing the Way We Make And Use Clothes*. Earthscan, London, Washington DC.

Mouwitz, Pia (2013), *To make clothes that matter - From tradition to new design aesthetics*. Research within the Baltic fashion project, The Swedish School of Textiles. University of Borås. Retrieved in 15.02.2016. Link: <http://hb.diva-portal.org/smash/get/diva2:884803/FULLTEXT01.pdf>

Niinimäki, Kirsi (2013), *Tenents of Sustainable Fashion*. p. 12-29 in **Ed. Niinimäki**, Kirsi (2013), *Sustainable Fashion: New Approaches*. Unigrafia, Helsinki.

Niinimäki, Kirsi (2013), *Values and Green Aesthetics*. p.32-37 in **Ed. Niinimäki**, Kirsi (2013), *Sustainable Fashion: New Approaches*. Unigrafia, Helsinki.

Palomo-Lovinski, Noël, **Hahn**, Kim (2014), *Fashion Design Industry Impressions of Current Sustainable Practices*, *Fashion Practice*. p.87-106 in *The Journal of Design, Creative Process & the Fashion Industry* 6:1. Retrieved in 16.02.2016. Link: <http://dx.doi.org/10.2752/175693814X13916967094911>

Reiley, Kathryn, **DeLong**, Marilyn (2011) *A Consumer Vision for Sustainable Fashion Practice*. p.63-84 in *Fashion Practice* 3:1. Retrieved in 15.02.2016. Link: <http://dx.doi.org/10.2752/175693811X12925927157054>

Report of the World Commission on Environment and Development: Our Common Future (1987). Retrieved in 27.01.2016. Link: <http://www.un-documents.net/our-common-future.pdf>

Rissanen, Timo (2011), *Designing Endurance*. p.127-135 in **Ed. Gwilt**, Alison, **Rissanen**, Timo (2011), *Shaping Sustainable Fashion. Changing the Way We Make And Use Clothes*. Earthscan, London, Washington DC.

Rissanen, Timo (2015), *The Fashion System Through a Lens of Zero-Waste Fashion Design*. p.201-209 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Rissanen, Timo (2008), *Creating Fashion without the Creation of Fabric Waste*. p.184-206 in **Ed. Hethorn**, Janet, **Ulasewicz**, Connie (2008), *Sustainable Fashion: Why Now?, A Conversation About Issues, Practices, And Possibilities*. Fairchild Books, U.S.A.

Strauss, Carolyn (2015), *Speed*. p.82-90 in **Ed. Fletcher**, Kate, **Tham**, Mathilda (2015), *Routledge Handbook of Sustainability and Fashion*. Earthscan from Routledge, London.

Tham, Mathilda (2012), *Slow and Fast Fashion*. p.216-218 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Thomas, Sue (2008), *From "Green Blur" to Ecofashion: Fashioning an Ecolexicon*. p.525-539 in *Fashion Theory, The Journal of Dress, Body and Culture*, 12:4. Retrieved in 16.02.2016. Link: <http://dx.doi.org/10.2752/175174108X346977>

Vadicherla, Thilak, **Saravanan**, D. (2014), *Textiles and Apparel Development Using Recycled and Reclaimed Fibers*. p. 139-160 in **Ed. Muthu**, Subramanian Senthilkannan (2014), *Roadmap to Sustainable Textiles and Clothing: Eco-friendly Raw Materials, Technologies, and Processing Methods*. Springer, Singapore.

Walker, Stuart (2007), *Design Redux*. p.57-73 in **Ed. Chapman**, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

Weller, Ines (2013), *Sustainable Consumption and Production Patterns in the Clothing Sector, Is Green the New Black?*. p.185-194 in **Ed. Gardetti**, Miguel, **Torres**, Ana (2013), *Sustainability in Fashion and Textiles: Values, Design, production and Consumption*. Greenleaf Publishing Limited, UK.

Wolfe, David (2012), *Classics' and Sustainability*. p.133 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Wood, John (2007), *Relative Abundance: Fuller's Discovery that the Glass Is Always Half Full*. p.97-115 in **Ed. Chapman**, Jonathan, **Gant**, Nick (2007), *Designers, Visionaries and Other Stories, A Collection of Sustainable Design Essays*. Earthscan, London.

Yusuf, Nick (2012) *Enduring fashion: Favourite Pieces*. p.222-229 in **Ed. Black**, Sandy (2012), *The Sustainable Fashion Handbook*. Thames & Hudson Ltd, London.

Zheng, Hao, **Wang**, Lixia (2012), *Collision of Fast and Slow*. p.115-118 in International Proceedings of Economics Development and Research, Vol.58. Retrieved in 18.02.2016.

Lectures

Holmstrand, Hans-Christian (2012). Trash to trend Erasmus IP workshop, 20 November 2012. Tallinn, Estonia.

Web sources

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